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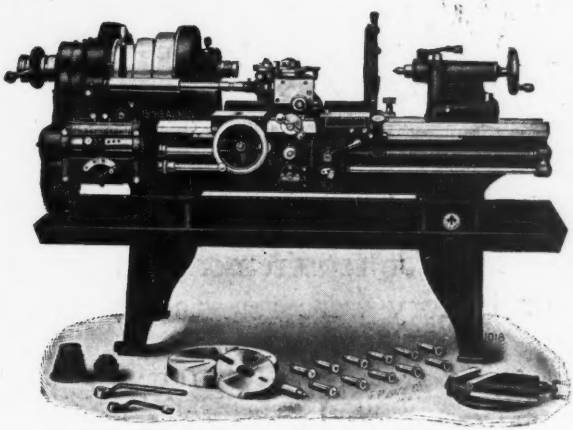
MODERN Machine Shop

October, 1928

Le Blond
Tool Room Lathes



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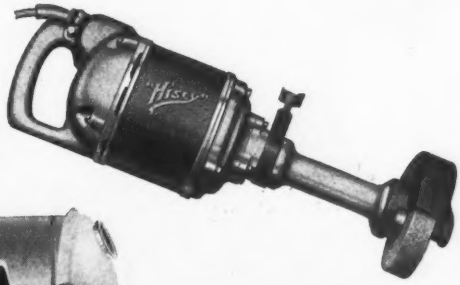

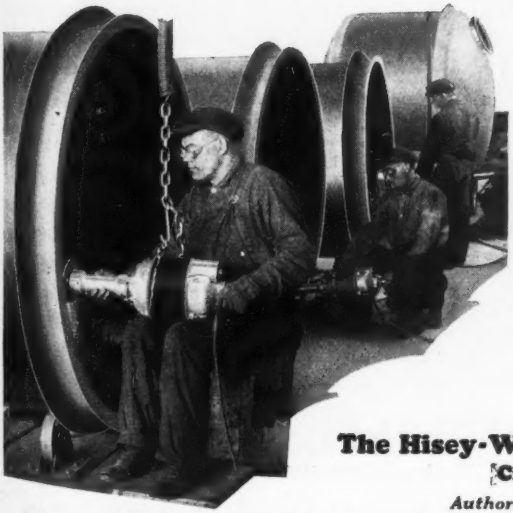

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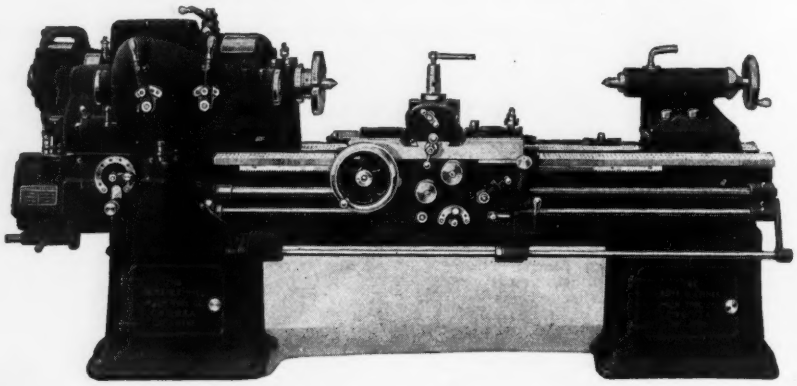

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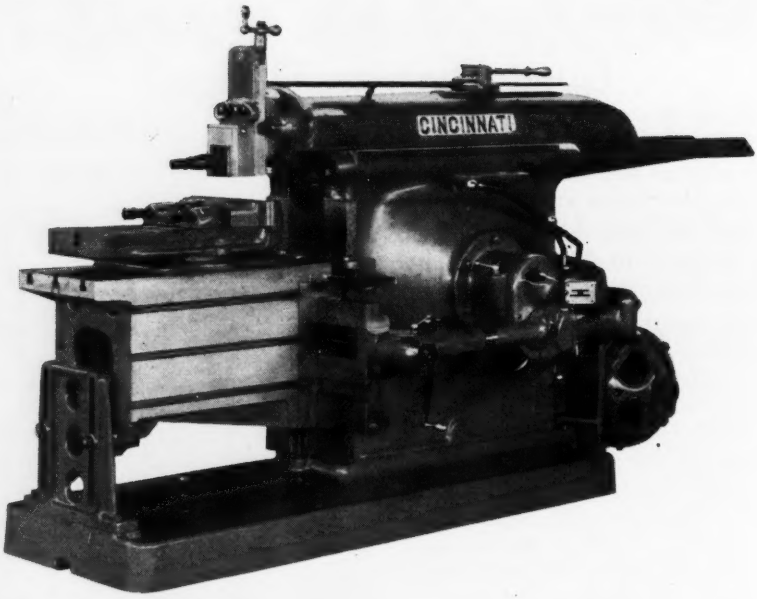

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MODERN
Machine Shop

A MAGAZINE FOR MACHINE SHOP EXECUTIVES

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Vol. 1 OCTOBER, 1928 No. 5

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OCTOBER, 1928

CINCINNATI, OHIO VOL. 1, NO. 5

Building the Monocoupe

By AVERY E. GRANVILLE

NOW that transportation by airplane is on a sound basis, a considerable amount of attention is being focused on the individual characteristics of the various types of planes. Accordingly, a description of the methods in use for building a well-known plane—the Monocoupe—may be interesting to our readers. The Monocoupe is a light passenger plane, built by Mono-Aircraft, Inc., at the plant of the Velie Motors Corporation, Moline, Ill.

The Velie aircraft engine most in use at present is the five-cylinder type, illustrated in Fig. 1. The cylinders are of nickel steel, with integral fins, and the heads are of Lynite. Each cylinder has one inlet and one exhaust valve, seating on aluminum bronze. The valves are of silchrome steel, and are 1-11/16 inches in diameter with 11/32-inch stems, with valve lifters of the roller type. Both valves operate from the same cam.

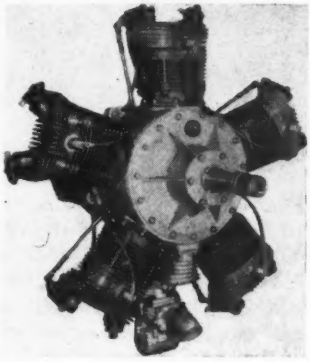


Fig. 1—Front view Velie Aircraft 70 H. P. Engine.

In machining the cylinder, the piece is first chucked in a special chuck on an automatic lathe and the head end is faced and turned for the head. The finish diameter is 4.500 inches, with a limit of .001 inch. The turning tool is held in an arm that projects from the turret, while two facing operations are performed with cross slide tools, as shown in Fig. 2.

The second operation on the cylinder—boring, reaming, facing and turning—is also performed on an automatic lathe, Fig. 3. Cross slide tools turn the cylinder for the crankcase fit and face the end and shoulder, while a boring tool in a bar that is held in the turret is boring the piece. In order to obtain the maximum of accuracy on the boring operation, the boring bar is provided with a pilot which slides into a bushing in the center of the chuck just before the tool starts cutting. As the pilot cannot be too long, the bushing projects from the chuck. In order to

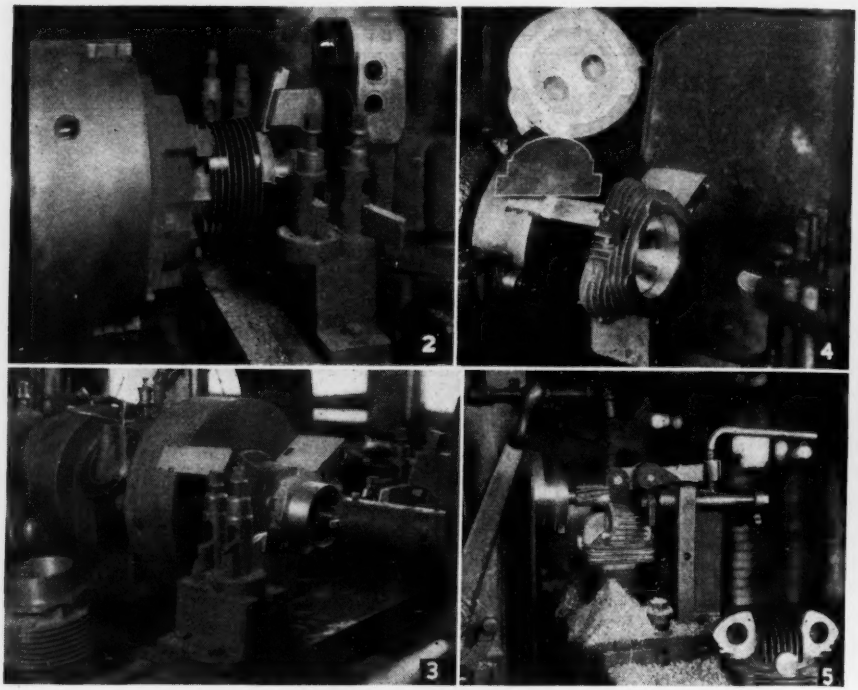
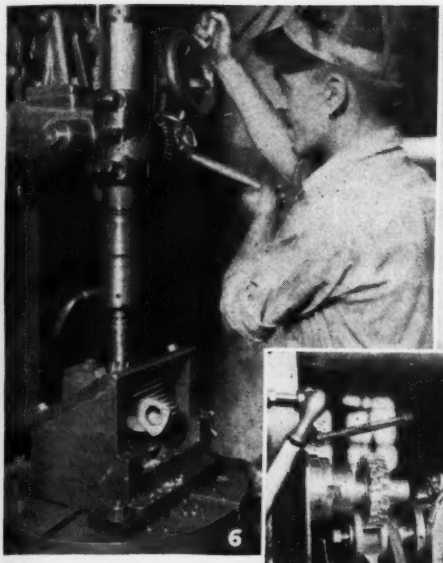


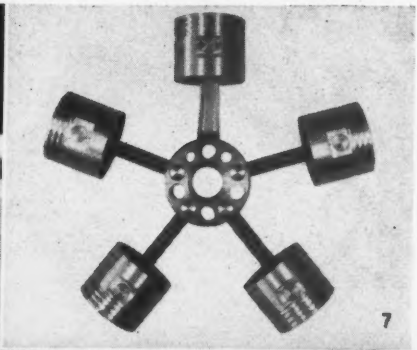
Fig. 2—Machining head end of cylinder. Fig. 3—Boring, turning and facing the cylinder. Fig. 4—Finished cylinder head, with radius-forming tool. Fig. 5—Milling cylinder head for rocker arm brackets.

avoid interference with the boring bar as it nears the end of the bore, the bushing is held in a second bushing, in which it is a slip fit. A spring behind the sliding bushing allows it to be pushed back by the end of the bar, the bushing resuming its original position as the bar is withdrawn. The cylinder is bored to 2.115 inches, leaving .010 inch for grinding.

A cylinder head is shown in a chuck, in Fig. 4, just after it has been bored and faced. The inside of the head is finished to a perfect radius, which is done with the form tool shown projecting from the turret, and the piece is then bored for a .005 press fit on the end of the cylinder. A limit of .005 inch is allowed on the dimension from the face of the head to the top of the combustion chamber. In assembling, the head is heated to between 250 and 300 degrees F., which expands it about .004, so that it can be assembled easily and without shearing the Lynite.

After the head has been bored, the faces of the port hole bosses are milled for the rocker arm brackets. In this operation, which is done on a milling machine, the head is located on a cylindrical piece in the fixture shown in Fig. 5 and is held in position by a clamp that bears down on the top of the piece. Pressure is applied by means of the screw with the "L" handle, which is located in the end of the clamp. The faces are finished to





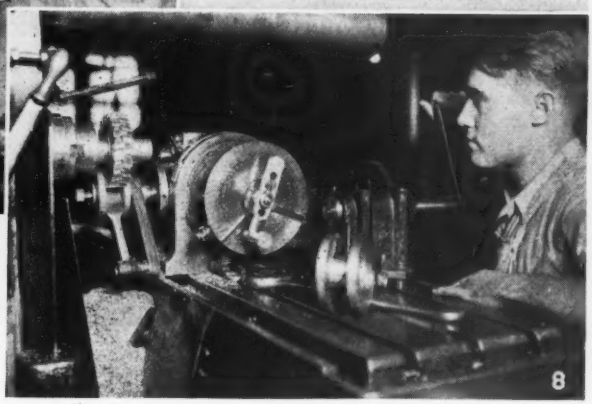


Fig. 6—Counterboring cylinder head for valve seats. Fig. 7—One-piece master connecting rod and link rods assembled with pistons. Fig. 8—Milling master rod for links.

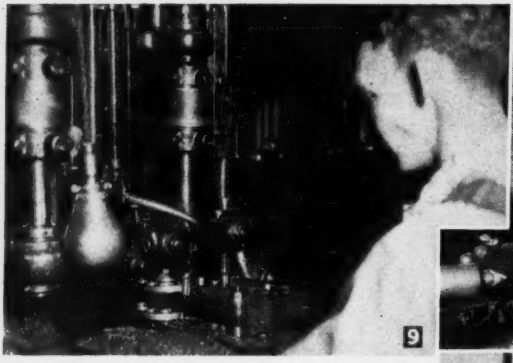
a dimension of 15/16 inch from the center line of the combustion chamber, within a limit of .005 inch. The tool is an end mill.

The next operation on the head is that of counterboring for the valve seats, which is done with the drill press shown in Fig. 6. The piece is held in a jig, as shown, and the machining is done with a shell reamer which machines both the diameter and the bottom of the hole.

The illustration Fig. 7 shows the connecting rod and piston assembly, consisting of a master connecting rod, four link rods, and five Lynite pistons. The master rod is of the solid big end type, with a babbit bushing spun in the rod for the crankpin. The link rods are bronze-bushed for the piston and wrist pins, oil being carried under pressure to all bearings.

Holes are drilled through the large and small ends of the master rod in the usual manner, then the rod is put on a fixture that is attached to a dividing head on a milling machine table, Fig. 8, and the clearance is milled for the links. The slot is held to a limit of .005 inch on the depth and .002 on the width.

The holes for the link rod pins are drilled in the next operation, and the rod is then locked in position in a fixture on a profiling machine, Fig. 9, and the channel is machined. Ma-



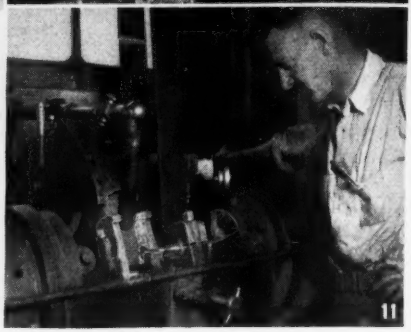


Fig. 9—Channeling the master rod on a profiling machine. Fig. 10—Grinding hole in the section of crankshaft. Fig. 11—Grinding the crankpin. The diameter is held within .0002 for taper and out-of-round.

chining the rod all over in this manner reduces it to a definite weight. In order to make sure that the same path is traveled by the tool on all rods and also to save time which would otherwise be spent in measuring, a master plate and guiding pin are provided to guide the tool. The plate is bolted to the table, as shown, and the pin is carried in the head that also carries the tool. By feeding the table so that the slot passes the pin on one side and returns on the other, the desired amount of stock is removed by the cutting tool.

In order to assemble the single-piece master connecting rod to the crankshaft, the shaft is made in two sections, the crankpin being integral with the forward section and telescoping into the rear section, through which it projects. The forward section carries the propeller. The hole in the rear section is ground to 1.875 inch diameter, within .0005, then it is pressed onto a corresponding fit on the forward section and locked in position by two dowel pins and a bolt. The bolt-hole is drilled half in each section, so that, once assembled, it is impossible for the piece to get out of alignment. The operation of grinding the hole in the rear section is shown in Fig. 10.

After assembling, the crankpin is ground on the machine shown in Fig. 11. Approximately .100 inch of stock is removed in this operation and the diameter is held to a limit of .0002 inch for taper and out-of-round.

(The second half of this article will be published in the October issue.)

A blue finish can be given to steel tools or parts by dipping the pieces in a bath of melted saltpetre, allowing them to remain in the bath until they are of the same temperature as the saltpetre, and then quenching them in water.

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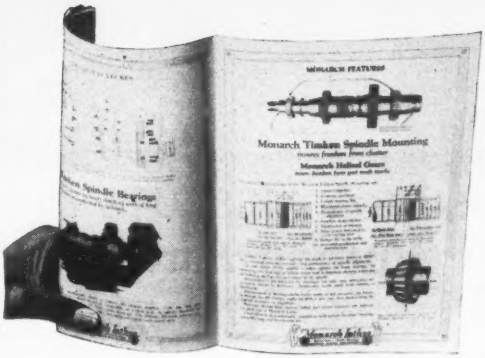

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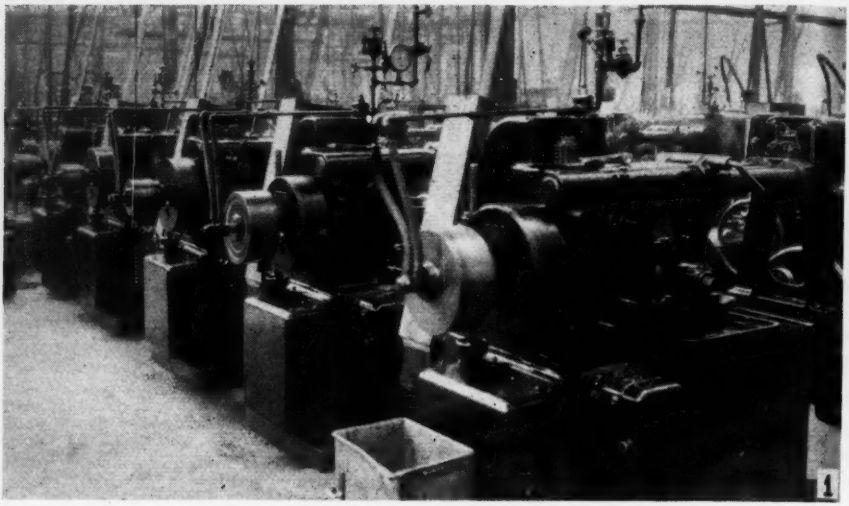


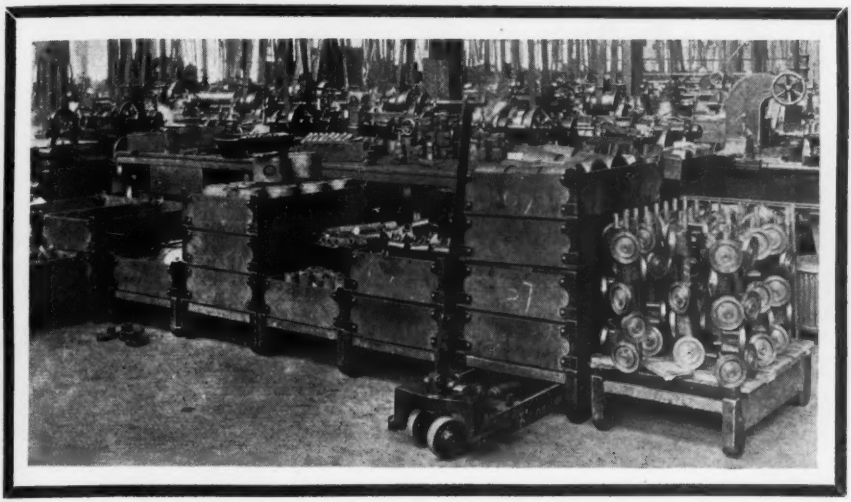
Putting Air To Work In the Chrysler Plant

By PHILIP WINTER

THIS is the age of machinery. The development of productive machinery of all kinds during the last thirty years has increased by many times the production of all kinds of merchandise, most of the results being obtained by making the machines perform all sorts of operations that were formerly considered hand work. Machines that index the work of tools automatically and which run at the highest possible speeds and feeds have reduced the actual machining time to the minimum. Therefore the attention of plant executives has for some time been focused on the development of methods or devices for cutting down the chucking or handling time.

Of all the methods employed for these purposes, the most satisfactory are the devices that are controlled by the use of air. The air works instantly, any amount of pressure desired can be obtained, and the operation of any air-operated device can be controlled by a small lever. The combined simplicity and efficiency of air-operated tools have led to their adoption by many of the larger automobile plants, of which the Chrysler plant at Newcastle, Ind., is a good example.

One of the first uses to which pneumatic force was applied was the operation of chuck-jaws, and air-operated chucks are now used on practically all machines on which chucks are used. The illustration at the head of this article shows a battery of five Barber-Colman gear hobbing machines, all equipped with air-cylinders for holding the work in position. The usual method is to clamp the work on



LeBLOND USES 33 STUEBING COWANS

THE question no longer is "Will lift trucks save us money in material handling?" For industry is daily proving that there is no question about it.

The only thing that remains to be determined is "How can we save the most money?" And that question, also, is rapidly being answered.

Ten years ago, on May 10, 1918, the R. K. LeBlond Company started to answer that question for themselves. They purchased their first Stuebing Lift Truck and put it to work in their plant.

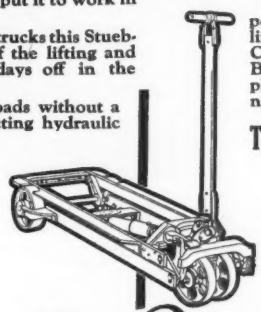
Side by side with other lift trucks this Stuebing did more than its share of the lifting and the hauling, for it had no days off in the repair shop.

It carried their heaviest loads without a whimper; and its positive acting hydraulic check eased the loads to the floor with velvety smoothness.

What was the natural result? Another order for Stuebing Cowans. And order followed order until, today, 33 Stuebing-Cowans are in constant uninterrupted service.

Does the R. K. LeBlond Company know what lift trucks will save them the most money? 33 Stuebing Cowans are proof that they have answered that question beyond a shadow of a doubt.

If you want to make all the saving possible, with your material handling equipment, specify Stuebing Cowan Lift Trucks and "Steel Bound" Skid Platforms. Your telephone will connect you with our nearest factory branch.



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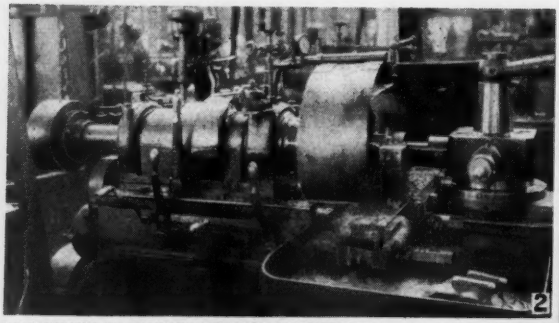
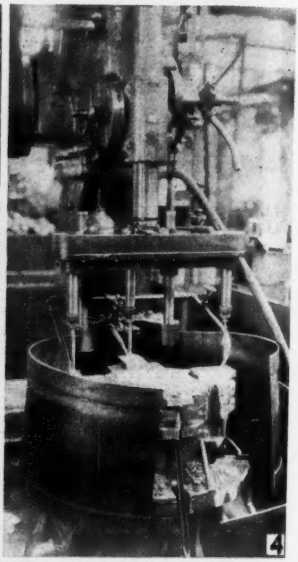
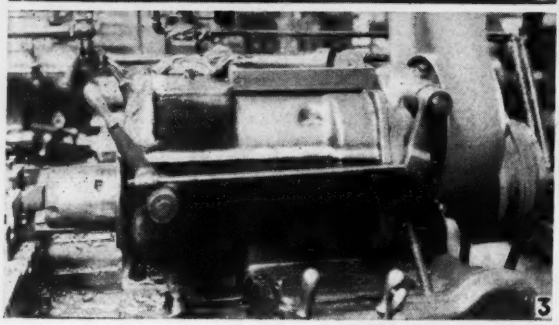






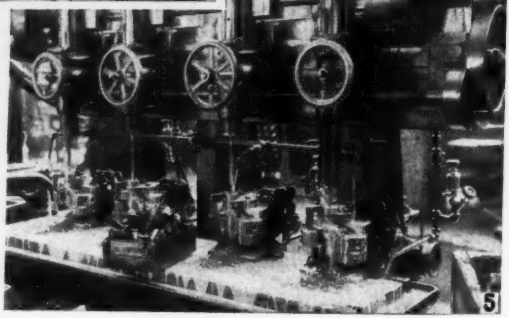


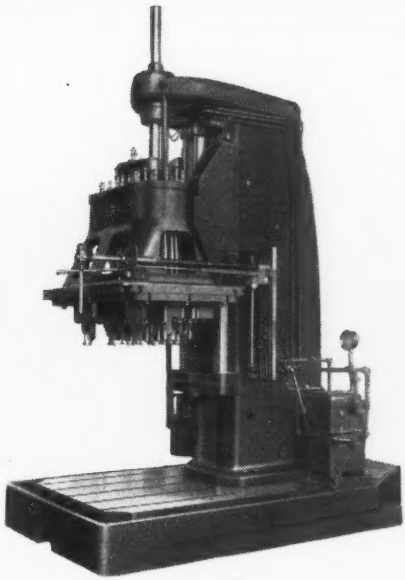
Fig. 2—An automatic lathe equipped with a two-jaw chuck that is operated by air. Fig. 3—The chuck on this lathe is equipped with compensating jaws, controlled by air. Fig. 4—A multiple drill with four air-operated chucks on a revolving table. Fig. 5—A four-spindle drill equipped with three-jaw air-operated chucks. Handling time is reduced to the minimum and the number of spindles per operator is increased.

the arbor by a draw bar and hand wheel, which necessitates changing the overarm support each time the machine is reloaded. The arbors on the machines shown are made so that they can be removed sufficiently to remove the work without disturbing the overarm support. By means of a bayonet lock, the arbor is connected to the air cylinder draw rod, the action of the air cylinder pulling the work against the end of the machine spindle. This method has proven to be faster as well as more accurate. The accuracy is of more importance because of the gears having a few thousandths of stock left on the sides of the teeth, which are finished on a shaving machine.

An example of a more common adaptation of the air-chuck is shown in Fig. 2, where a Logan air-chuck is shown in use on a Potter & Johnson automatic lathe. The chuck is of the two-jaw variety, and is used to hold a

NATCO

C16H
HEAVY
DUTY



NATCO HYDRAULIC MULTIPLE DRILLER

The above illustration shows a Natco C16H Heavy Duty Hydraulic Multiple Spindle Driller designed for production drilling of large holes. The entire machine is unusually rugged in construction, cascade lubrication and frictionless bearings being used to insure long life with little attention.

The hydraulic feed is semi-automatic and the pressure is supplied by an Oilgear pump. Pulling the starting lever starts the head traveling forward rapidly. It automatically drops into power feed, drills to correct depth and then into rapid reverse and stops.

NATCO PRODUCTS

Standard Adj. Multiple	Hi-Duty Single Spindle
Fixed Center Multiple	Drillers and Tappers
Single Purpose Automatic	Special Machines

May we give you a proposition on your "holes"?

THE NATIONAL AUTOMATIC TOOL CO.
RICHMOND, INDIANA, U. S. A.

transmission brake support for machining. The jaws open or close instantly as the valve is opened, eliminating the laborious job of screwing down the jaws by hand. And as the brake support is made of malleable iron and is of comparatively light construction, it is very easily sprung or distorted when a hand-operated chuck is used. Air, with an air regulator in the line, will always give the same amount of pressure. It is obvious that when the chuck-jaws are screwed down by hand, the pressure will vary from one piece to another, and if the piece is fragile, it is bound to be distorted unless a great deal of care is taken.

A rear view of the headstock of an automatic lathe is illustrated in Fig. 3, showing the end of a piece of work held between the two jaws of an equalizing chuck. The piece is actually held between the tailstock and headstock centers, the chuck serving only to drive the piece. Obviously the jaws must be arranged so that they will adjust themselves in order to grip the piece without bearing more on one side than the other, and this is accomplished by having the jaws connected by toggle joints to the draw rod in such a way that the jaws are permitted to center themselves on the work independently before being brought into positive gripping position by the air pressure.

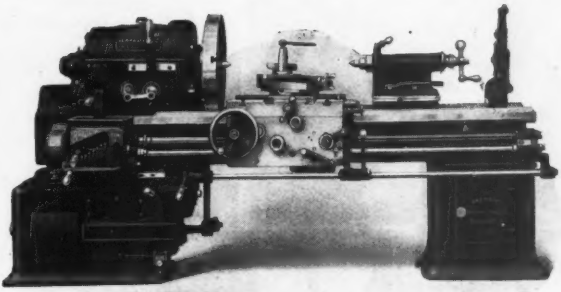
Work can be held by air-operated devices on vertical machines as well as horizontal, as evidenced by the illustration Fig. 4. Here is a Barnes drill with a three-spindle drill head and a rotating table on which four pieces are held at a time by four individual Logan air-operated chucks. The operation is that of drilling the hole in the handle end of a hand brake lever. The feature of this air device is the two sets of equalizing jaws that hold the work central regardless of the variation in the forging. A small hole is drilled the full length of the handle, then the hole is counterbored half way for the spring. As the small plunger hole is twice the length of the spring hole, the first two spindles of the drill are arranged so that each will drill half of the hole, the third spindle carrying the drill which does the counterboring operation. The fourth position, at the front of the machine, is the loading position. The levers are held in two-jaw chucks, each of which are opened and closed by air. The air control valve is located at the right side of the chuck so that the operator need lose no time, and he has just time to open the chuck, replace the work, and close the chuck again as the drills finish.

A four-spindle Barnes drill with Logan air-operated chucks of a different type is shown in Fig. 5. This machine is drilling gear shifter forks, each piece being held in a two-jaw chuck which is opened and closed by air. By reducing the time required for chucking to the minimum, an operator can be given more spindles to handle and the labor cost is thus reduced.

The operation of drilling all the holes in a front axle is shown in Fig. 6, the equipment consisting of a Barnes 4-spindle drill and a fixture with a head at either end to hold the ends of the axle. The heads are operated in and out by means of a right and left hand screw to which is fastened a pinion gear. The gear is operated by a rack, which is fastened to the draw rod of an air cylinder. The action is almost instantaneous, saving the time of operating the right and left hand screw by hand. The air clamps the two ends simultaneously. The operator's energy is also conserved, as the hand clamping mechanism entailed a considerable amount of hand labor.

The great saving that has resulted

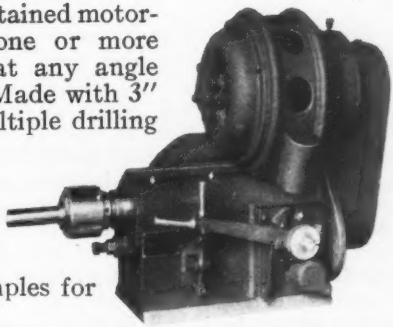
SINGLE LEVER CONTROL *of* BRADFORD ALL-GEARED LATHES



A single lever conveniently located in front of lathe *starts, stops* and *reverses;* also single lever for *changing speeds.* These features together with the *patented low drive* make the BRADFORD *all-geared* lathe a producer of *much better lathe work* and *more of it.* Made in sizes from 14″ to 48″ inclusive. Let us tell you more about this quality tool. Your catalog is waiting.

BRADFORD "UNIMATIC"

For *Drilling* and *Tapping* in *Quantity*



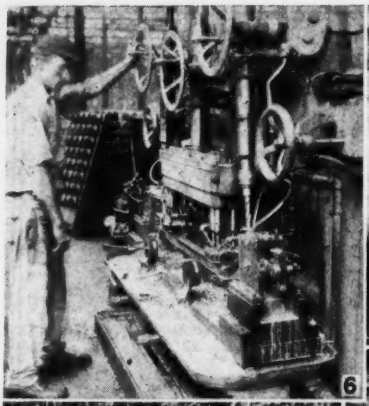
The UNIMATIC is self-contained motor-driven head, designed for one or more heads built into one unit at any angle from horizontal to vertical. Made with 3″ or 6″ stroke for single or multiple drilling up to 1⅛″ and tapping up to 1″ in steel. Sold as a separate head or made up into complete machines for any particular job.

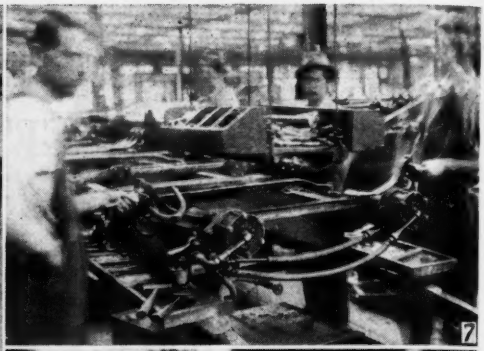
Send us your prints or samples for production estimates.

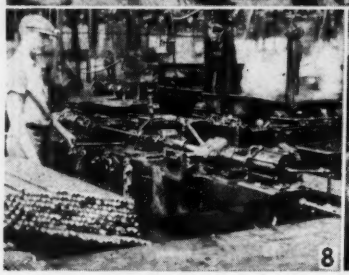
THE BRADFORD MACHINE TOOL COMPANY

659 EVANS STREET **CINCINNATI, OHIO**

Precision Lathe Builders Since 1840







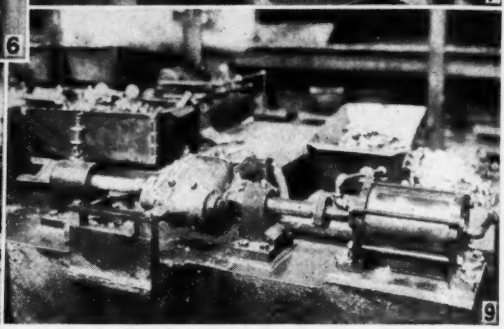


Fig. 6—Drilling front axles, holding the work in air-operated jig. Both ends are clamped instantly and simultaneously by the movement of one lever. Fig. 7—Air-operated vises reduce assembling time and save labor. Fig. 8—Tie-rod ends are assembled to the rods with this machine. Fig. 9—View of one end of machine, showing jaw, air-cylinder and air-motor.

from the use of air-operated work-holding devices in the machine shop has led to the development of similar devices for holding work while assembling. The mechanics shown in Fig. 7 are assembling the king-pins to an axle, the axle being held by two air-operated Logan vises. One jaw of the vise is stationary and the other is attached to the piston rod of an air cylinder in such a way that, as air is let into either end of the cylinder, the piston moves back and forth and carries the jaw with it. The air control lever is located directly in front of the mechanic, where it can be easily reached with one hand while the other is placing the axle in position, and the axle is clamped or released instantly when air is applied. With a cylinder six inches in diameter, pressure of approximately 2,000 pounds is applied to the movable jaw. Time which was formerly wasted in tightening and loosening the jaws of hand-operated vises is now applied to productive work.

One of the finest examples in this plant of the way air can be utilized to save both time and labor is illustrated in Fig. 8. Here a machine that consists principally of two air motors, two air cylinders, and two air-operated vises is used to assemble the tie-rod ends to the tie-rods. The rod is placed in position between the jaws of the vise, where it is clamped with

(Continued on page 58)

Barnes Upright Drills

Barnes 22½-inch Stationary Head Drill with Silent Chain Motor Drive

With Stationary Head—
15, 20, 22½, 25-inch swing.

—

With Sliding Head—
22, 26, 28, 34, 42, 50-inch swing.

Gang Drills—
20 to 26-inch swing.

Barnes Upright Drills are made in a range of sizes from the 50-inch swing, required in the railroad shop, to the 15 and 20-inch sizes used in the small machine repair shop and garage service.

Arranged for Silent Chain or Belted Motor Drive. With or without Power Feed.

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W. F. and JOHN BARNES CO.

ROCKFORD, ILLINOIS

Upright Drills
Horizontal and Vertical Production

Screw Presses
Drilling and Boring Machines

Time Study—Its Uses and Value

By HOWARD CAMPBELL

VERY few plant executives realized, before the present methods of making time studies were developed, the vast amount of time that was lost every day due to circumstances which could easily be changed. If a machine was in poor condition, or broke down entirely, the foreman passed the buck to the machine repair department. And with all employees working on an hourly or day-work basis, the mechanic was not much concerned as to whether the machine ran or not, as long as his pay went on. Each machine operator had one set of tools, which had to be ground at regular intervals, involving a trip to the grinding wheel and perhaps a wait for others who were there first. Material was set down somewhere near the machine for which it was intended, and if the material ran out, the operator waited for more. Every machinist who has been at the trade many years, or who has worked in a "day-work" shop, is familiar with this picture.

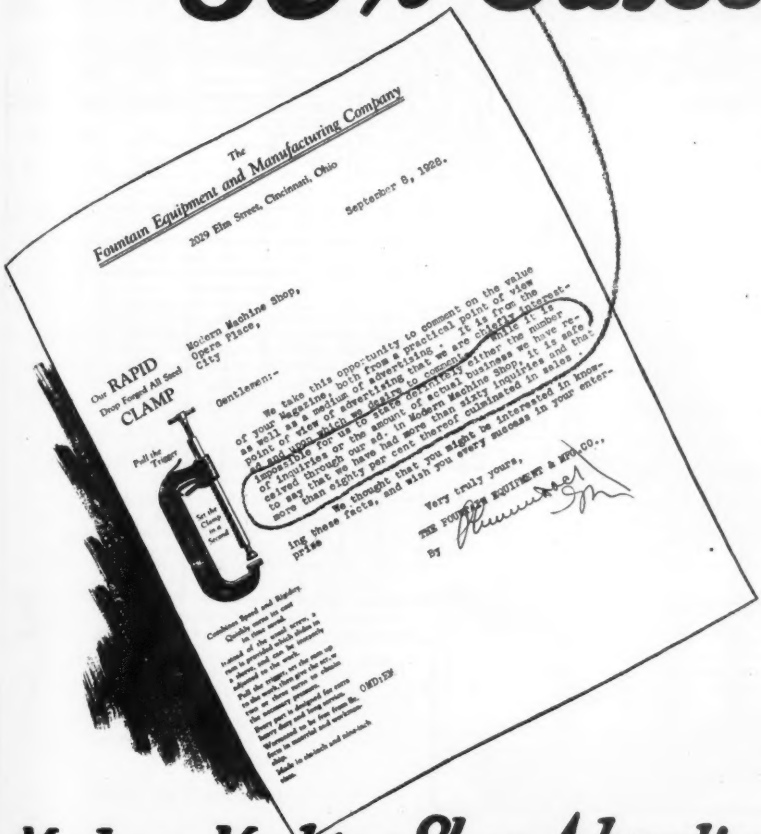
There are still hundreds of shops in which, for various reasons, the day-rate still prevails, and where the cost of operation is much higher than it should be. In many of such shops the installation of a piece-work or bonus system would be difficult, but there are others in which such a system would be entirely practicable, and the adoption of modern methods of wage-payment would result in increased production and lower costs.

Whenever possible, the mechanic should be given a piece-work price, or bonus, which amounts to the same thing. Piece-work is a much better proposition for both the shop and the worker than day-work; the shop-owner gets all that he pays for, and the mechanic gets paid for exactly what he produces. A piece-work or bonus system cannot, however, be installed haphazardly; the proper preparations must be made for it.

To begin with, there is no use of trying to put a price or premium on a job unless the mechanic has material for at least a half-day's work ahead of him at a time. Provision should be made so that he will not have to wait for either material or tools, but once a workman gets started on piece-work, he will soon show up all the inefficiencies of the job. He will insist on having the material placed within reach, at the side of the machine, instead of several feet away where he will have to go after it. He will insist on having several of each of the tools that he uses, so that no time will be lost in grinding tools. And he will want the tools ground for him, so that he can put in his time producing. He will run the machine at the highest speed and feed at which good work can be turned out, and if there is anything wrong with the machine or tools, he will enter a complaint "pronto." In other words, putting an operator on piece-work puts him in business for himself, and henceforth he looks at his machine in exactly the same light that the management looks at the plant as a whole; he is there to make it produce as much as possible. Obviously, with the workers assuming this attitude toward their jobs, the management is relieved of a considerable load of responsibility as to quantity and quality of production.

The average day-worker assumes that if he keeps busy, he is rendering

60 inquiries 80% Sales!


The
Fountain Equipment and Manufacturing Company
2039 Elm Street, Cincinnati, Ohio
September 8, 1928.
Modern Machine Shop,
Opera Place,
City
Gentlemen:-
We take this opportunity to comment on the value
of your magazine both from a practical point of view
as well as a medium of advertising. It is from the
point of view which we are chiefly interested in
regarding your publication. We have received
inquiries or orders to the amount of actual business we have re-
ceived through the advertising we have carried in Modern Machine Shop, it is safe
to say that we have had more than sixty inquiries and that
more than eighty per cent thereof culminated in sales.
We thought that you might be interested in know-
ing these facts, and wish you every success in your enter-
prise
Very truly yours,
THE FOUNTAIN EQUIPMENT & MFG. CO.,
By
Our RAPID
Drop Forged All Steel
CLAMP
Pull the Trigger
For the Clamp on a Second
Combines Speed and Rigidity
Quickly screw on one
of the usual screws, a
screw is provided on each
clamp to fit the block requiring
a clamp in the work.
Pull the trigger, set the screw up
to the work, then put the screw up
the second screw in obtain
the pressure desired for even
heavy duty and long service.
Made in clutch and screw-inch
sizes

Modern Machine Shop Advertisers get RESULTS!

TIME STUDY SHEET

DANLY MACHINE SPECIALTIES, INC.

FILE NO. _____ DATE 2-17-28

PART NO. 20793 NAME Toggle Lever MACHINE 20" Drill

OPERATION Drill and Ream one ⅞ hole FEED Drill-.010 Ream-Hand

OPERATOR P. Smith CLOCK NO. 57 SPEED 90 ft. per min.

	ELEMENTS	1	2	3	4	5	6	7	8	9	10	Average	Mini.	Standard
1	Clean jig	06	07	06	07	05	06	06	06			06	05	06
		06	07	06	07	05	06	06	06					
2	Clamp piece	16	17	18	18	15	17	19	18			11	10	10
		10	10	12	11	10	11	13	12					
3	Drill	1.23	1.24	1.24	1.25	1.22	1.22	1.26	1.23			1.06½	1.05	1.06
		1.07	1.07	1.06	1.07	1.07	1.05	1.07	1.05					
4	Change tools	1.32	1.33	1.34	1.33	1.31	1.31	1.37	1.32			09	08	09
		09	09	.10	08	09	09	11	09					
5	Ream	1.53	1.53	1.57	1.54	1.53	1.52	1.57	1.56			21	20	20
		21	20	23	21	22	21	20	24					
6	Change tools	2.02	2.04	2.06	2.04	2.03	2.01	2.08	2.05			10	09	09
		09	11	09	10	10	09	.11	09					
7	Remove piece	2.07	2.09	2.13	2.10	2.08	2.07	2.16	2.09			05	04	05
		05	05	07	06	05	06	08	04					
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MEAN TIME PER ~~100~~ PIECE	2.05 MIN.
+ OR - 90% EFFICIENCY RATE	1.87 MIN.
4 % PERSONAL ALLOWANCE	
3 % TOOLING " .	
10 % FATIGUE " .	
% " .	
20 % BONUS " .	
37 % TOTAL ALLOWANCE	.75 MIN
STANDARD MIN. PER ~~100~~ PIECE	2.62
" HOURS " 100 "	4.36
" PIECES PER HOUR	23

TIME STARTED	TIME COMPLETE	ELAPSED TIME	2.05 TOTAL

OBSERVER W A Schultz

CHECKED BY HEC

Form of time study sheet. The continuous time is posted in the upper space in each column, and the individual time in the lower space.

Self-Oiling All-Geared *Drilling Machines*

FOR accurate drilling at high speeds the No. 266 Self-Oiling All-Geared, All Ball-Bearing Drilling Machines illustrated will provide the right speed and feed for drills up to 2½" diameter—and for boring cored holes or cylinders to 8" diameter.

The sliding head and table are especially convenient when long boring bars are used, for deep hole drilling and for large work. Table can be removed readily for mounting work directly on finished base of machine. Round column and swing table available if desired—this is No. 263. These two models are powerful producers of general work in the modern machine shop—and equally efficient in working to "tenths" in the tool room.

No. 242 Self-Oiling, All-Geared Drilling and Tapping Machine is a world-beater for general heavy duty work, No. 210 for specialized quantity manufacturing. Our cylinder honing machines—vertical or horizontal, single or multiple spindle—are pioneers and leaders in the field. They produce a cylinder finish superior to internal grinding.

Self-Oiling All-Geared Machines have many distinctive features of design and construction which increase shop capacity and earning power everywhere these modern machines are installed. Built in single spindle, gang and many special types.

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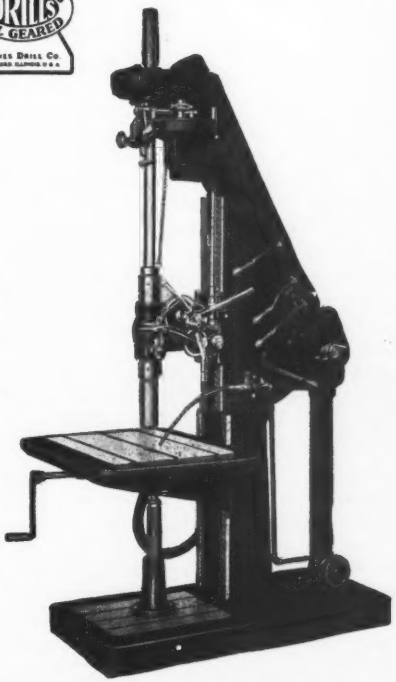


BARNES DRILL CO.

801-851 Chestnut Street **Rockford, Illinois**

fair service for fair pay—in which he is undoubtedly right. If he can be induced to exert himself to the utmost and increase his production substantially, he should be paid accordingly. In order to gauge the rate of payment intelligently, the management should first learn the length of time required to turn out a piece of work with all lost motion eliminated, which can best be done by making a time study of the job.

The making of a time study is no sleight-of-hand trick, but it requires a thorough knowledge of the equipment and—what is equally as important—a reasonable amount of horse-sense. With these two qualifications and a personality that makes friends easily, anyone should be able to make accurate time studies with a little practice.

The tools required include a reliable stop-watch, a pad of paper, and a pencil. For many years the writer used a pad that would slip into the pocket easily, but a pad of the standard 8½x11-inch size, with columns ruled off for the various notations and held on a board that also has a pocket for the stop-watch, will be found most practical and convenient. The watch-pocket is located in an upper corner of the board, within easy reach of the hand that is supporting the board.

Whether the dial of the watch is divided into seconds or hundredths of a minute is a matter of preference, but the "hundredths" watches are more generally used where time study is an important factor. The watch should have a slide at the side so that it can be stopped at any point in the progress of the study and started again without the necessity of going back to the beginning. The advantage of this feature will become more apparent after a few time studies have been made.

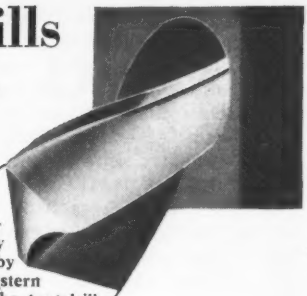
The object of the time study is, of course, to determine the correct amount of time required to perform an operation, an operation being all that is done to a piece of work from the time it is picked up until it is put down again. This is accomplished by dividing the operation into the movements of which it is composed, and finding the time required for each movement. Unnecessary movements can then be eliminated, and unnecessarily long "times" on legitimate movements can be corrected. The time study man's experience and judgment should guide him as to the correct amount of time required for the various movements, and he will find that it is practically impossible for an operator to deliberately slow down and gauge his movements so that the same amount of time will be required on each of several pieces. If he tries to prolong the time required, the movements on which he "stalls" will vary on the different pieces so that the time study man will have no difficulty in discovering the correct allowance.

It has been the writer's experience that the best way to make a time study is to first follow the operator through an operation, listing each movement or "detail" of the operation in order. After the list has been made and corrected, he takes a position conveniently close to the operator—but not in his way—and starts the watch as the operator picks up a piece of work. He does not stop the watch again until the piece has been put down, unless something happens to the equipment or the operator stops to do something that is not included in the operation. In that case he simply stops it, starting it again from that position when the operation is resumed. A reading is taken at the end of each movement, or detail, which is recorded in the left of two columns or upper of two spaces. When the study is complete, the time of each detail is found by a process of subtraction and listed in the right-hand

How Six "Cle-Forge" Drills Increased Production—

from 850 to 2600 pieces per day

Job consists of sinking six No. 31, wire gauge, holes in straight row on .156-inch centers. Drill press is of semi-automatic type, designed to drill all six holes in gang. The Six No. 31 CLE-FORGE HIGH SPEED DRILLS rotate at 6,000 r. p. m. Feed is .0067 inch per revolution, or about 4.2 inches per minute. Cylinder is about ½-inch outside diameter, with ⅛-inch hole drilled off-center parallel to the axis. Drills first penetrate the thin wall and then the thick one at point diametrically opposite. When drilling is done, chuck automatically withdraws piece, and discharges as it revolves again to loading position.



Greater economy was desired by a prominent Eastern manufacturer in the gang drilling of 6 close-spaced holes through a brass pin tumbler lock cylinder.

Ordinary carbon drills, No. 31 wire gauge, were unable to produce holes of uniform size—had an average life of only 400 holes per drill—and cost $1.95 per 1,000 cylinders. Total cost of both drills and press amounted to $12.54 per 1,000 cylinders.

When CLE-FORGE HIGH SPEED DRILLS were introduced an instant improvement was noticeable. Not only were the holes absolutely uniform and accurate, but production was speeded up and costs materially reduced.

With a high average life of 11,000 holes per drill, CLE-FORGE DRILLS lowered drill cost from $1.95 to 10c per 1,000 cylinders—and cut total drill and press cost from $12.54 to $3.56 per 1,000 cylinders!

Not only was production jumped from 850 to 2600 cylinders per day, but—

The net annual saving, on this job alone, resulting from the use of CLE-FORGE DRILLS, amounted to $1,167.50!

THIS complete performance report is absorbingly interesting—and we predict you will find it so, too. We have it in Digest No. 56, and shall be glad to send you a copy upon request.

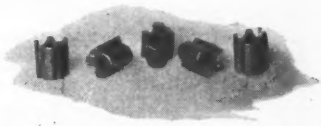
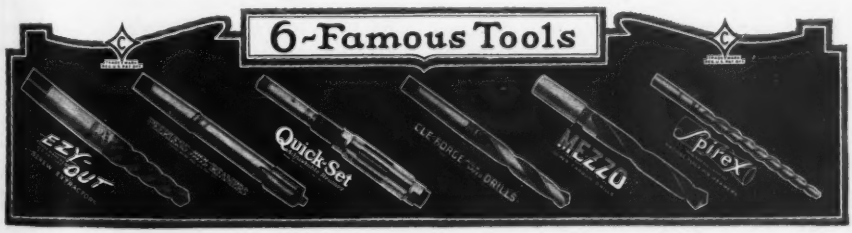


Illustration of brass pin tumbler lock cylinders. CLE-FORGE HIGH SPEED DRILLS increased production of these cylinders from 850 to 2600 per day, effecting a 71.6% saving in drilling cost!

The CLEVELAND TWIST DRILL COMPANY CLEVELAND
NEW YORK CHICAGO LONDON SAN FRANCISCO
TRADE MARK REG. U. S. PAT. OFF. AND FOREIGN COUNTRIES

Manufacturers of Carbon and Cle-Forge High Speed Drills for every purpose: "Mezzo" Super-Carbon Drills; Hand, Jobbers' and Shell Reamers; "Peerless" High Speed Reamers; "Paradox" Adjustable Reamers; "Quick-Set Reamers; "Spirex" Machine Taper Pin Reamers; Chucking Reamers for Turret Lathes; Counterbores; Countersinks; Sockets; End Mills; and the "Ezy-Out" Screw Extractor.



column or lower space. A comparison of the several studies will show the variations in the times required, and a final determination can be made for each detail and listed in the "time allowed" or "standard time" column.

The standard time should not necessarily be the total of the shortest amounts taken for each of the details, which would be 100 per cent, although this is the allowance used under certain "bonus" systems. In such systems, however, payment begins at a point considerably below the 100 per cent mark, the full amount of bonus being paid for 100 per cent efficiency. The standard time should be such that the operator can, by working as rapidly as possible, turn out one piece after another within the time set and keep up the pace for half a day at a time. In the last analysis, all that is asked of a man is that he work as fast as possible without injuring himself, that he make every move count, and that he lose no time doing things which are not a part of the task.

The fact that an operator can, by intense application, turn out a piece of work in three minutes does not, however, mean that he can turn out twenty pieces per hour. He has to change tools now and then; he may have to punch a job timecard; he may have to stop for a minor repair to a tool or to the machine; he must be allowed time to go for drinking water and to the toilet. The next question is "what allowance should be made for these items?" In some shops a flat percentage is added to the time of each job to cover necessary lost time, the allowance usually varying from 10 to 15 per cent. This system is practicable where the operators work at the same task continuously, but in a shop where the jobs are changed frequently, allowance must be made for changing the tooling. On the time study sheet shown, allowances are made for personal requirements, tooling, and fatigue, and in this case the bonus allowance is included. The time study man has also estimated the efficiency of the operator and based his bonus rate accordingly, which may or may not be good practice. Some time study men prefer to take care of that factor in the standard time.

Having set the standard time of an operation, it is a simple matter to compute the bonus allowance or piecework price. The next point to be decided is the amount that the operator is to be allowed to make if he turns out the maximum possible production. This often has to be varied according to the job, although the usual method is to allow a given percentage, such as 30 per cent, over the day rate. Assuming that the operator on a job that has been selected for piece work has a day rating of 60 cents per hour, an addition of 30 per cent, or 18 cents, will make him a total of 78 cents per hour if he delivers the maximum production. Dividing the 78 cents by the number of pieces expected will give the price per piece.

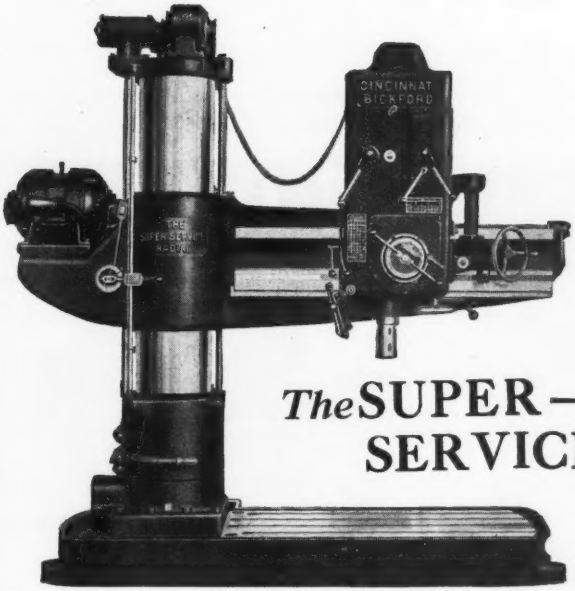
The making of stop-watch time studies and the installation of a piece work or bonus system in a shop that has always been on the day-rate basis is a matter that calls for a considerable amount of diplomacy. Men who have always worked by the hour are apt to resent being "timed," and their first thought is that the piece rating is intended to get more work out of them. And so it is, but they are to be paid accordingly, and this fact must be made very clear to them in the beginning. Let one man be timed and a rate set on his job that will enable him to immediately begin making 30 per cent more wages than he has been making, and the rest will soon be clamoring for the time study man to set prices on their jobs.

Above all, the time study man or foreman must be fair and reasonable. If a complaint is made about the time allowed on a job, he should recheck

(Continued on page 54)

More Holes per Dollar

With SUPER-SERVICE Radials



The SUPER—SERVICE *Radial*

Less Handling Time—More Time for Drilling

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The Cincinnati Bickford Tool Co.

OAKWOOD, CINCINNATI, OHIO

Some Unusual Drilling Machine Jobs

By DONALD A. CLARK

A GOOD drilling machine is a versatile piece of equipment, and machine shop executives who have begun to appreciate this fact are finding new uses for the drill press every day. Many jobs that were formerly done on other types of machines have been turned over to the drill press, and, arranged in multiples of two, three, or four spindles and equipped with air-operated devices to manipulate the jigs and fixtures, it is taking its place as one of the most important machines in the shop.

Until a comparatively recent date the idea prevailed that a drill press job was a simple task and could be done in only one way. At this writing nothing is being taken for granted, and, instead of trying to machine the piece in the orthodox way, the ideal arrangement is determined and then tooling is built up to fit this ideal. One of such jobs is shown in Fig. 1. The piece is an automobile jack screw through which a hole is drilled to the full length of 5½ inches. The hole must be perfectly concentric because the Acme square thread on the outside of the piece is so deep that there is a very thin wall of metal left at the bottom of the thread.

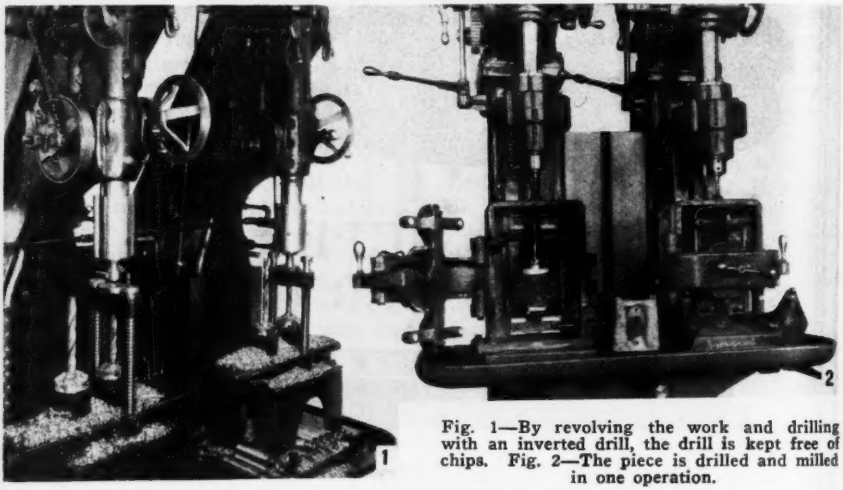
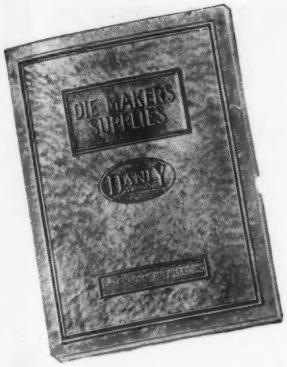


Fig. 1—By revolving the work and drilling with an inverted drill, the drill is kept free of chips. Fig. 2—The piece is drilled and milled in one operation.

The usual method of operation is reversed, the piece being held in the spindle while the two drills are located on the sliding table of each fixture in an inverted position, one drill being short and central with a bushing through which the piece is inserted. The work bushing is concentric with the drill bushing, thus making certain that the hole will be started in the exact center of the piece. The hole is drilled approximately one inch deep

(Photos and data courtesy Barnes Drill Company)



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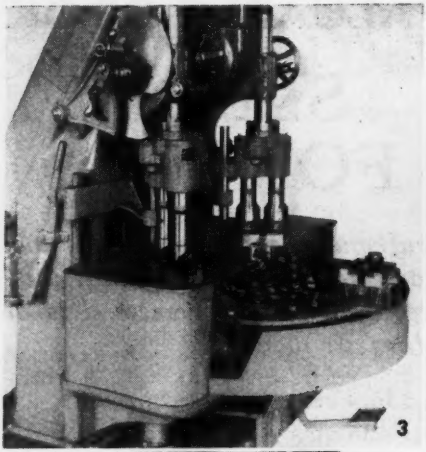
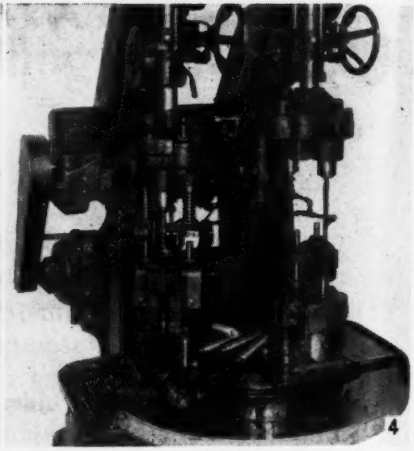




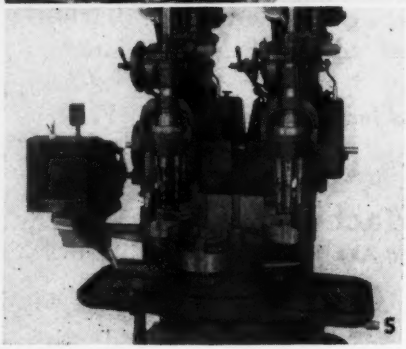


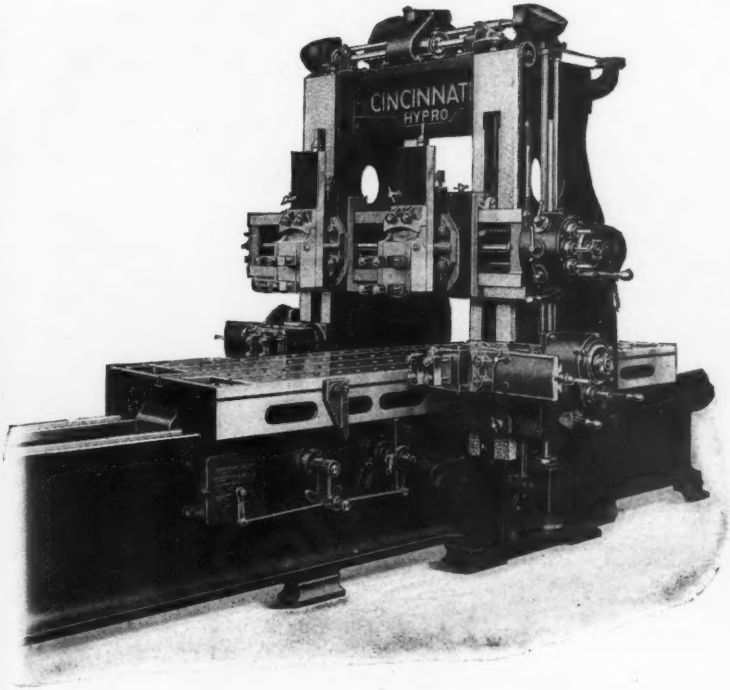
Fig. 3—This equipment turns and threads 200 radiator plugs per hour. Fig. 4—Drilling and tapping jack screws. Fig. 5—Using three-spindle heads and a three-station rotating fixture to machine brass castings.

with the stub drill, then the sliding table is moved over and the drilling is completed. The principal advantage of this inverted drilling process is that the oil, which is fed to the job through the drill, washes the chips out and prevents sticking or breakage of the drill.

The illustration Fig. 2 shows an interesting method of handling a difficult job. The piece is a Maytag washing machine frame in which three holes are drilled close together—too close to make possible the use of a three-spindle head—and in the same operation a milling cutter finishes a semi-circular surface inside the casting. The former method of machining the piece required the services of two milling machines, besides which the small holes were drilled in one operation and the large hole in another. With the equipment shown, the two $\frac{5}{16}$-inch holes, which are farthest apart, are drilled with the aid of a two-spindle head and at the same movement of the spindle an end-mill, located in the lower part of the fixture, machines a semi-circular surface. Then the spindle is raised, lifting the small drills and milling cutter and an inverted $\frac{15}{16}$-inch drill, which drills the third hole. The large drill and mill are driven by a shaft that is located in a housing at the rear of the fixture and extending down from the head. Two pieces are finished complete in forty-five seconds.

The machine shown in Fig. 3 is equipped to machine radiator plugs, each machine spindle carrying a two-spindle head. The table carries three jigs so that the operator can be loading one while the other two are in process. The first head is equipped with two Gairing hollow mills, with

CINCINNATI HYPRO-PLANER



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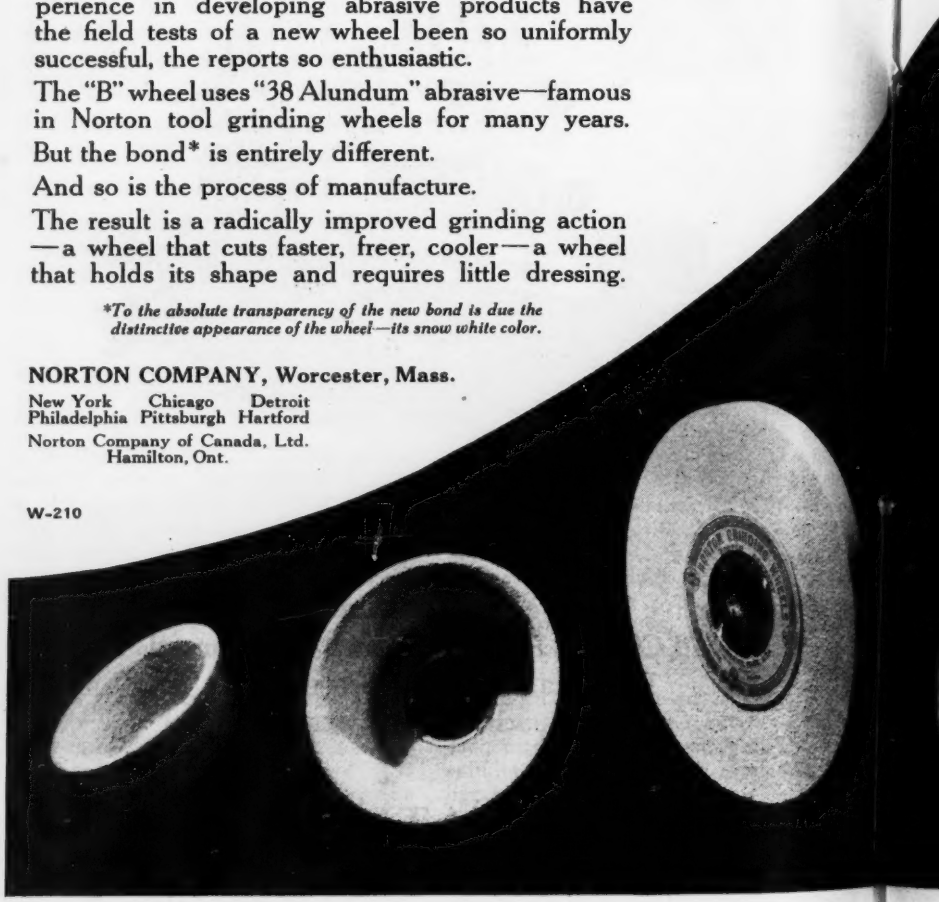
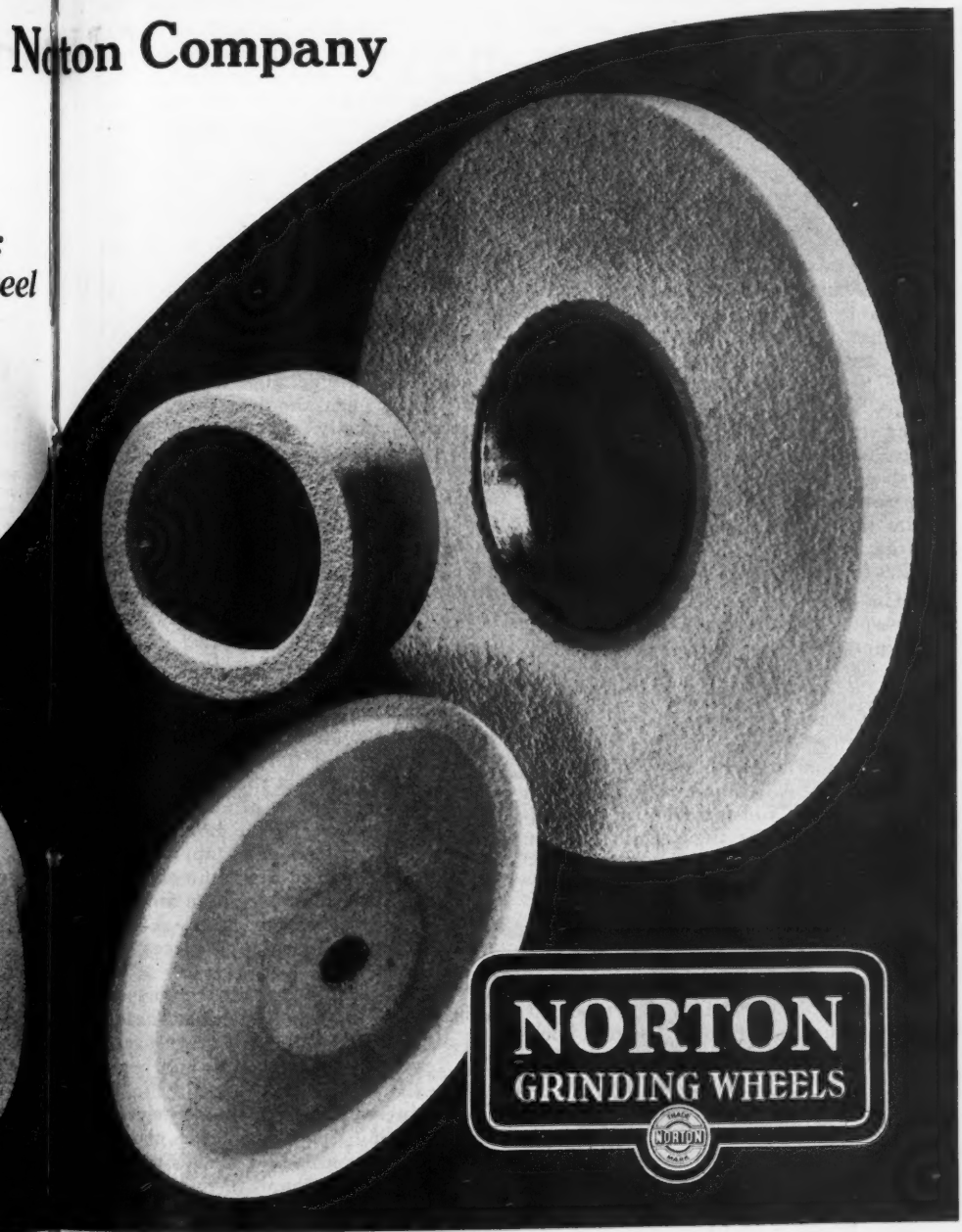


Norton Company



which the plugs are turned, and the second head carries two Pottsdown dies for threading. An interesting feature of this job is the cam feed, which can be varied to give any amount of feed desired. The production is 200 plugs per hour.

The illustration Fig. 4 shows another operation on a jack screw. In this operation the piece is drilled and tapped by chucking the work in a Duplex chuck on a three-station rotating table, and then swinging the table so that the work will be passed to two two-spindle heads in turn, the first head being equipped with two drills and the second carrying two long taper taps. The speed of the taps is timed so that they back out just as the drills finish the drilling operation and thus no time is lost. The jig can be indexed in less than three seconds. This outfit produces 1,200 to 1,600 pieces per day.

The machine shown in Fig. 5 is a two-spindle automatic gang drill equipped with two three-spindle heads and a three-station hand-indexing work table with Barker Wrenchless vises for holding three brass castings. While three pieces are in process of being drilled at the first station, three pieces are simultaneously being reamed, faced and turned with Gairing combined tools at the second station and during these operations the operator is reloading at the third station. A production of twelve pieces per minute is maintained with this outfit.

Equipment for an unusually fast operation is shown in Fig. 6, where a two-spindle gang drill is shown set up for tapping pressed steel spuds, such as are used on steel barrels. Each machine-spindle carries a two-spindle auxiliary head, in each spindle of which is a collapsible tap. The pieces are held in two air-operated jigs, the action of the air serving not only to slide the jigs from one position to the other, which is accomplished with the aid of air-cylinders, but also to clamp the work against the torque of the tap during the machining operation. The resetting bracket resets the taps between operations, and as the spindles are automatic in action as to approach and return, the operator needs only to reload the spare stations and operate the air valve. The production on this operation averages from 600 to 700 pieces per hour.

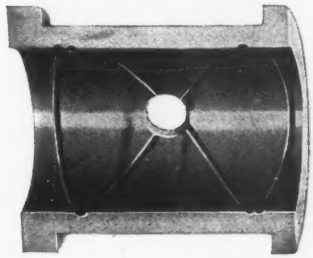
The illustration Fig. 7 shows a three-spindle gang drill, each spindle of which carries a four-spindle head. The work is located on a four-station rotating hand-indexing work table, and a foot pedal hookup is supplied for automatically engaging all three feeds simultaneously immediately after the table is indexed. The operation is that of drilling, facing, and tapping the stem ends of forged yokes such as are used on automobile brake rods. The head for the drilling operation carries four pressure feet to compensate for variations in the length of the forgings, the pressure feet being equipped with cone bushings which securely hold the upper ends of the stems and center them. The second spindle is equipped with facing tools which pilot in the holes drilled in the first operation and at the same chucking of the work, thus producing faces that are square with the holes. The third spindle carries four taps and, as the table is indexed after the tapping operation, an ejector kicks the finished pieces out of the jig. On ⅝-inch yokes the production is 960 pieces per hour.

A three-spindle gang drill equipped with three four-spindle auxiliary heads and a rotating table with "turn-over" jigs, set up to drill, chamfer and ream spring shackles is illustrated in Fig. 8. The jig-turning mechanism is enclosed in a housing that has been photographed so as to show a "phantom" view of the mechanism. Each jig holds two pieces which are drilled at both ends in the first operation, cham-

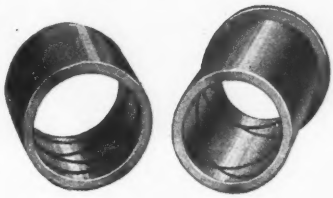
Oil Grooves Like These

4

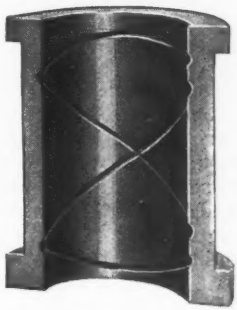
Per Minute



ON a CISCO UNIVERSAL LATHE GROOVING ATTACHMENT, the time required to oil groove a brass bearing 2" long with a 2" bore with a single figure eight oil groove is FOUR PER MINUTE. Compare this time with the old hand method of chipping oil grooves.



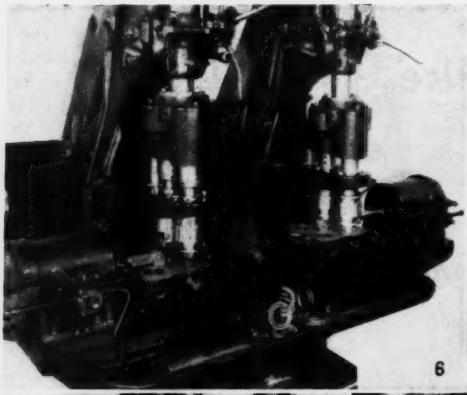
The attachment is readily adaptable to any standard make of engine lathe, from 14" to 24" inclusive. It cuts several types of figure eight oil groves, inside or outside the bearing. It is built in three sizes of 6", 9", and 12" maximum lengths of stroke. The diameter is limited only to the swing of the lathe on which the attachment is used. The depth of the groove is controlled by the operator.

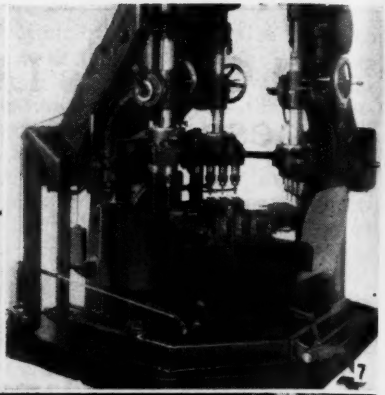


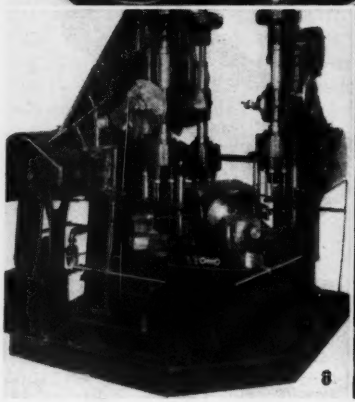
Wherever installed, the attachment will pay for itself by the increase in production, and the time saved. Upon receipt of your request, we will be glad to send you bulletin and explain this attachment more in detail.

THE CISCO MACHINE TOOL COMPANY

1765 ELMORE STREET, CINCINNATI, OHIO







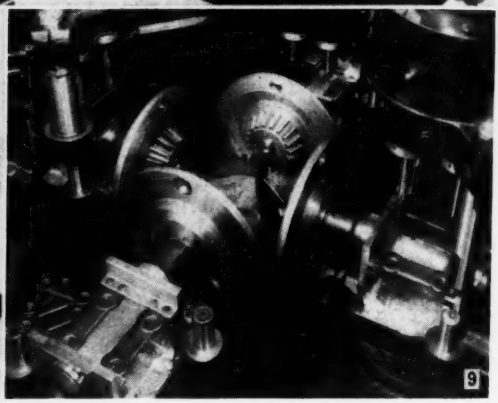
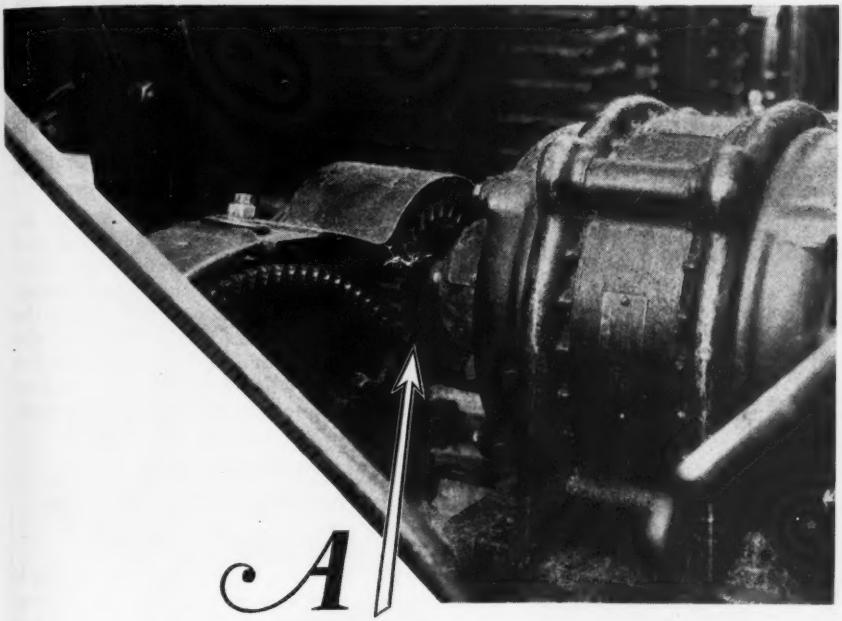


Fig. 6—Each jig is moved from one position to the other by air, which also clamps the work. Fig. 7—A three-spindle machine which drills, faces and taps 960 brake rod yokes per hour. Fig. 8—This fixture revolves between operations so that the piece can be chamfered on the reverse side. Fig. 9—View of the jig-turning mechanism, showing the jig-trunnions equipped with pinions, and the quadrant which turns the jigs over as the table revolves.

fered in reverse position in the second, and reamed in the third, while the operator is reloading the fourth jig. For one type of automobile, half the shackles are reamed and the balance are tapped, in which case two reamers and two taps are used in the third head, a geared thread-leading feed being supplied to feed the taps in at the right pitch and back them out again. The thread-leading feed makes the tapping action positive and precludes the possibility of spoiled work due to bad tapping.

As the rotating table is hydraulically controlled, it is only necessary for the operator to step on the foot pedal to index the table. This action releases the indexing plunger and opens the oil circuit so that the table is immediately revolved to the next position, at which point the plunger drops into place again. The revolving action of the table also turns over the jig between the first and second operations, each jig being supported by a trunnion shaft that carries a pinion

(Continued on page 54)



A FORMICA Driven Loom

THE FORMICA pinion shown in the picture is one of many in use on the looms of the Roxbury Carpet Company. It is driving a machine from the Crompton & Knowles Loom Works.

The textile industry is only one of the large users of machinery that is making a wider and wider application of Formica. Formica gears are quiet and sufficiently elastic to protect the machines from vibration and jarring.

Formica gears make machinery sound as though it were well taken care of. Visitors get a better impression. Such machinery is also easier to sell.

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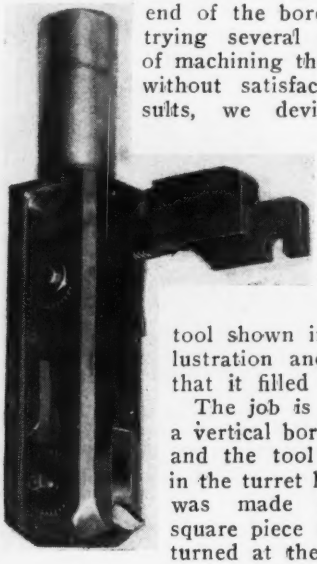
Ideas From Readers

This department is a clearing-house for ideas. If there is a "kink" or short-cut in use in your shop, send in a description of it. We will pay $5 for each one published.

Boring a Deep-Hole Radius

By S. LUNDE

ONE type of airplane cylinder that we have to machine is cast with a solid head, and we have to machine a radius in the closed end of the bore. After trying several methods of machining the radius, without satisfactory results, we devised the tool shown in the illustration and found that it filled the bill.



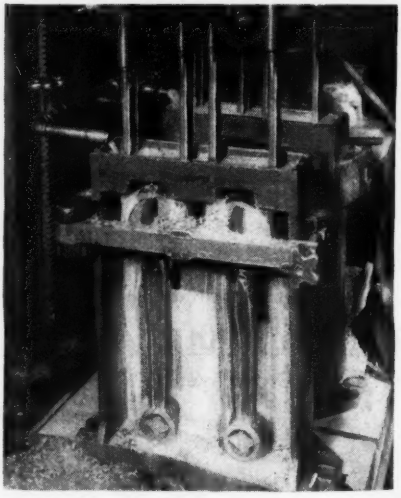
Tool for boring radius in a deep hole.

The job is done in a vertical boring mill, and the tool is held in the turret head. It was made from a square piece of steel, turned at the end to fit the turret, and machined to house two gear-shafts and two racks. The upper shaft carries two gears, one to mesh with teeth cut on the under side of a horizontal sliding arm, and the other to mesh with a sliding rack which also meshes with a gear at the lower end of the tool. The lower gear-shaft also carries a circular piece in which the tool-bit is held by a set screw. When the sliding arm is moved out or in, the upper gear shaft is revolved and the sliding rack is moved up or down, revolving the lower gear and swinging the tool on a radius. When the tool is in position for action, the slot in the horizontal sliding arm is hooked over a bolt head on the side head of the machine and machine feed is used, producing a perfect job.

Coolant Pockets in Jigs

By W. A. DAWSON

WE have a number of multiple drilling machines in our shop with which we have experienced a great deal of difficulty in keeping the drills well supplied with coolant. After



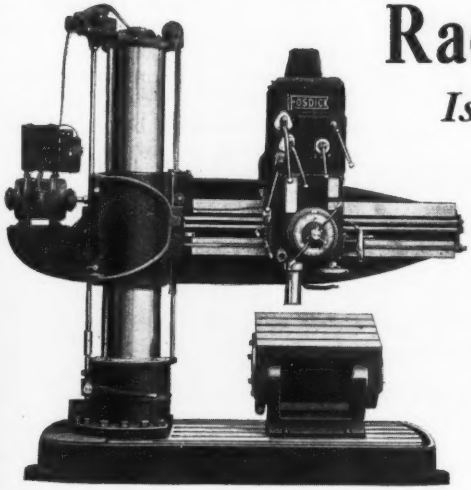
Jig with coolant reservoir in top.

For Heavy Duty Drilling—

THE NEW

FOSDICK "Economax" Radial Drill

Is the Ideal Machine



The most modern and up-to-date developments in engineering practice are incorporated in the design of this machine.

3 ft., 4 ft., 5 ft., 6 ft., 7 ft.

Consider These Special Fosdick Features:

Universal control at head—36 spindle speeds—Hardened alloy steel driving gears—Automatic lubrication—Tapered roller bearings—Extra large alloy steel spindle with six multiple splines—High pressure lubrication of spindle—Power rapid traverse of head on arm with friction drive—Tilting table with rigid clamping at all angles—18 feeds and 3 pipe-tap leads—Quick return of spindle—Dial divided into even inches—Tapping and driving mechanisms with indestructible multiple disc frictions—Taper roller bearing in loose pulley (if pulley drive)—Only one motor for elevating, head traverse, and driving spindle (if motor drive.) AC or DC.

THE FOSDICK MACHINE TOOL COMPANY

CINCINNATI, OHIO

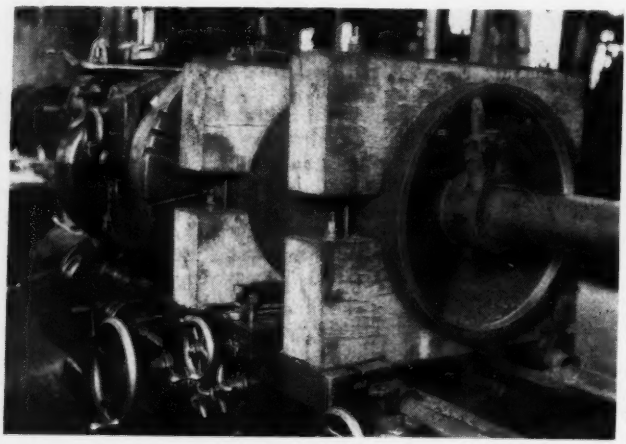
trying the more common methods without obtaining the desired results, we conceived the idea of having our jig castings made with receptacles, or reservoirs, in the tops of the castings. These reservoirs are kept full of the coolant and thus the tools are kept continually flooded. Since adopting this idea we have had no trouble from lack of coolant.

Machining Cylinder Bushings in the Lathe

By M. J. BRUSH

LACKING a boring mill large enough to machine a locomotive cylinder bushing in the usual manner, we devised the equipment shown in the photograph so that bushings can be bored in a lathe. The outfit consists of four oak blocks, bored to the approximate radius of the bushing casting, and a shaft that carries the boring tool. The blocks are bolted to the lathe carriage, as shown, the bushing is bolted between the upper and lower blocks, and the shaft is swung between the centers of the lathe. The tool, which is 1¼ inches square, is then set to bore the desired diameter, and the carriage, carrying the bushing, is fed past the tool by power feed. Just as good a job is produced with this outfit as could be produced by any other method. Different sizes of blocks are kept on hand to accommodate the bushings for different sizes of engines.

When the boring operation is finished, the blocks are removed and two cylinder heads which have been specially turned are bolted in the ends of the bushing by means of bolts that run through and project at both ends. As the heads have been center-drilled, the bushing is swung between the lathe centers and turned to size.



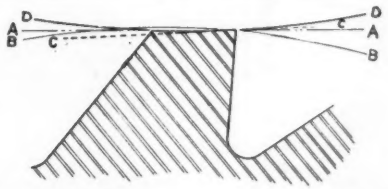
Boring a cylinder bushing in a lathe.

A Hardening Hint

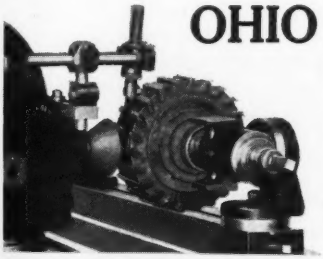
By R. H. KASPER

IN hardening a number of small broaches, difficulty was experienced in preventing excessive warping. After experimenting with several methods of quenching, it was found that the best results were obtained by rolling the broaches down an incline, so that they would be spinning when they struck the water. In order to avoid the necessity of using a very deep tank, a series of baffle plates was arranged in a short tank so that the broaches would be kept rolling and at the same time would have to travel the required distance before coming to a rest. By the time the broach has rolled off the last baffle plate, it is

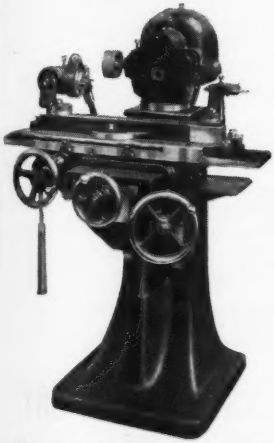
Cutting tools last longer—cut better—when properly ground



DD represents periphery of grinding wheel, BB circumference of cutter, AA desired clearance as obtained with cup wheel on Ohio Grinder, CC clearance angle obtained using periphery of grinding wheel for clearance.



Sharpening the Periphery of an Inserted Tooth Face Mill.



No. 2 Ohio Universal and Tool Grinder, Motor Driven, Forced Feed Table Lubrication.

OHIO Grinders preserve cutter life by correct grinding

MANY cutters pass their stage of usefulness prematurely due to incorrect grinding, but proper grinding costs no more than any other.

Ohio Grinders produce a solid backed cutting edge that has double the life of any hollow one.

The added life given to cutters is actually a saving in cutter investment. These small savings mount rapidly and soon pay for your machine.

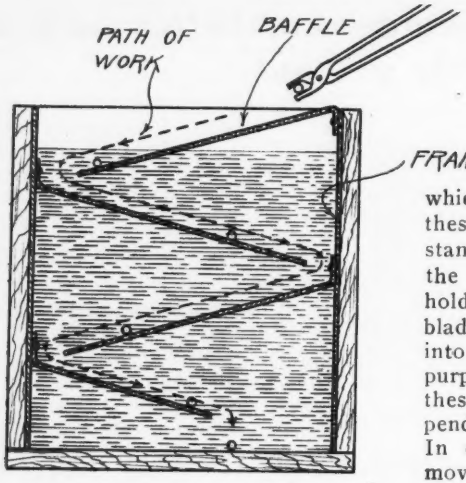
It's just as easy to make your tools do more work for less cost, even though the initial investment may be a trifle more.

The sketch above shows the difference between right and wrong grinding of face mills. The illustration at the left, correct set-up on an Ohio Grinder.

You can get a complete story on tool grinding from our booklet "E." Write for your copy today.

The Oesterlein Machine Co.

3319 Colerain Ave., Cincinnati, Ohio, U. S. A.



Quenching tank for round pieces.

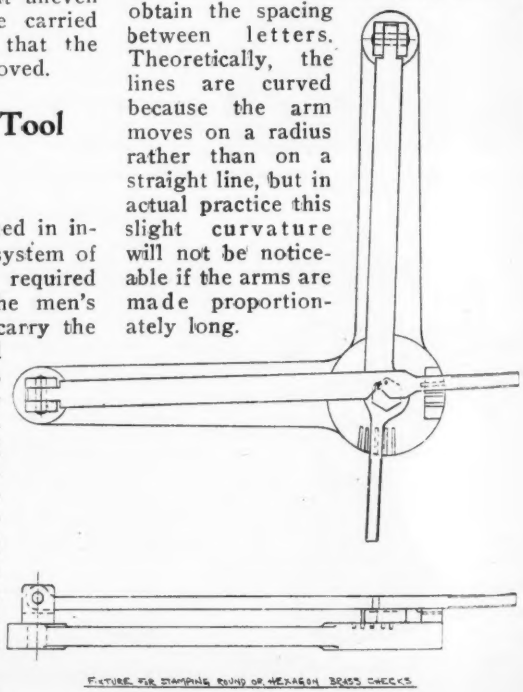
cooled sufficiently to prevent uneven hardening. The baffles are carried on a metal framework, so that the entire assembly can be removed.

Tool for Stamping Tool Checks

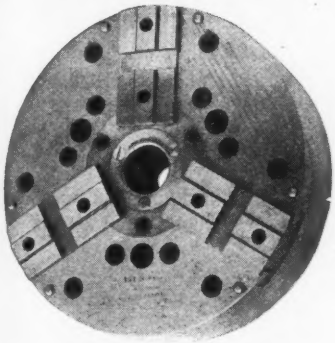
By H. C. KLINE

THE writer recently assisted in installing a double check system of tool crib control which required checks to correspond to the men's numbers and also those to carry the names of various tools issued out. Stamping these blanks by hand was a very slow process, as the inventory contained over 5,000 items, and it is also very difficult to produce a neat, legible check by this method. On the other hand, the relatively small quantity of new checks needed after the system was once started made the purchase of a marking machine inadvisable.

To secure a fairly readable check and to facilitate the work of lettering, the fixture shown in the accompanying sketch was designed. This simple device consists of an "L" shaped base, forged from flat stock, and two swinging arms which pivot on hinged studs. One of these arms has a slot to guide the stamp while it is being struck and the other arm has a pocket which holds the blank. Both arms have small blades on the under side which fit into grooves cut in the base for the purpose of indexing, the pitch of these grooves being, of course, dependent upon the size of letter used. In operation, the horizontal arm is moved to obtain the spacing between lines, while the vertical one is indexed after each stamping blow to obtain the spacing between letters. Theoretically, the lines are curved because the arm moves on a radius rather than on a straight line, but in actual practice this slight curvature will not be noticeable if the arms are made proportionately long.



Tool for stamping tool checks.



EFFICIENCY ACCURACY SPEED

are embodied in

"HOPKINS" CHUCKS

"Hopkins" Air Chucks are dust proof.

All jaws are hardened ground.

Bell Crank for operating chuck is one piece—a drop forging.

The face plates are fastened to the chuck body with socket-head, heat-treated screws. They are dowelled with taper dowells and in case of wear can be removed and enough stock ground off on the surface grinder to take care of the wear.

A complete bulletin describing "Hopkins" Air-Operated Chucks, Cylinders and Valves will be gladly sent to you upon request.

THE TOMKINS-JOHNSON CO.
620 NORTH MECHANIC ST.
JACKSON - - MICHIGAN

Multiple Units

From Single Drills

Designed to fit any type of drill press, a U. S. Drill Head converts any single spindle drill into a multiple unit quickly.

No time wasted making adjustments—spindles are fixed. Any number of holes, fifty if necessary, can be drilled as easily as one.

We will design a U. S. Multiple Drill Head to meet your individual requirements. Tell us your needs. Address

The United States Drill Head Co.
1954 Riverside Drive
Cincinnati, O., U. S. A.

MODERN Machine Shop

Published Monthly at
128 Opera Place, Cincinnati, Ohio
By
DON G. GARDNER - - - - *Publisher*
HOWARD CAMPBELL - - - - *Editor*

White Collar Jobs

"Only one out of five high school students gets a white collar job nowadays," we learn from Nicholas Riciardi of the State Educational Department. It might be more accurate to say that only one in five is foolish enough to take such a job.

"In a world already highly machined and becoming more so, the prizes are going to the men who know how to handle machines, and white collars do not go well with oil pumps. We hear about the lawyers and doctors who get big fees from rich clients and patients, but there are many professional men who envy the steady employment and good pay of good mechanics.

"Look over the industrial field and see how many are white collar men. Henry Ford certainly did not find the white collar appropriate to his tinkering together the first automobile he made that would run. Lindbergh, as a mail flyer, found a woolen shirt better than a white linen one. The Wright brothers wore overalls in the bicycle shop where they made the first practical airplane. The Dodge brothers were mechanics working for day wages. Walter Chrysler was an engine wiper. Charles M. Schwab pushed a wheelbarrow in the steel mills. Thomas A. Edison started life, not with a job that called for a white collar but that called for none at all.

"These men all wound up in white collar jobs, it is true. But they are not the jobs that go to beginners. More and more the rising generation is fighting shy of the jobs that start and end with white collars and is going to the overall jobs that mean sure income and, perhaps, a real prize so big that they will not even think of the white collar that goes with it."

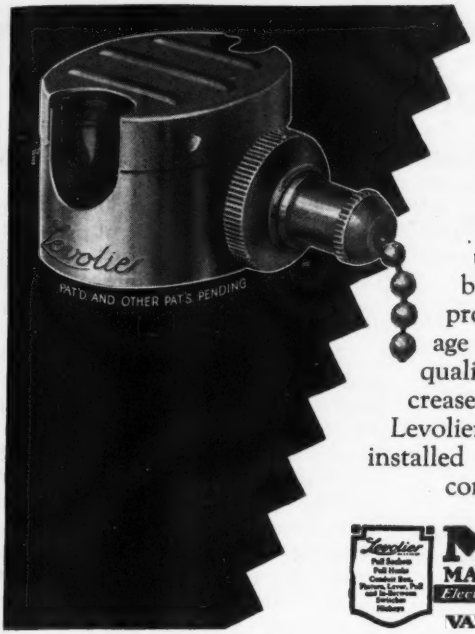
—San Francisco Chronicle.

The "Putting-On Tool"

Many of the older mechanics of today can still remember the pranks that were played on them by the older men during their apprenticeship days, one of such pranks consisting of being sent to fetch the "putting-on tool." The tool which then existed only in the jester's imagination has become a reality, and many kinds of defective material that in other days would have been scrapped are now reclaimed —as good as new—at a comparatively small expense in material and labor.

Holes that were drilled too large or in the wrong place are made solid metal again; parts that are turned too small or bored too large are rebuilt so that they can be reclaimed; blow holes in castings are filled with metal which amalgamates with the surrounding material; broken pieces are made whole again. In fact, the percentage of spoiled or defective pieces that cannot be reclaimed is comparatively small.

This wonderful tool is, of course, the welding torch. Every large metal-manufacturing plant has its welding department, and no small shop that is doing any amount of business or attempting to offer real service can consider its equipment complete without a welding outfit of some type, kind, or description.



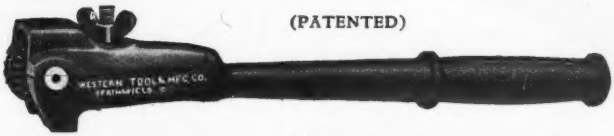
The NEW *Levolier* Fixture Switch

Control your shop lighting units individually. Install a better lighting system and lower production costs, cut out spoilage and accidents, improve the quality of the product and decrease labor turnover. The new Levolier Fixture Switch is easily installed and saves labor costs, extra conduit and wall switch.

McGILL MANUFACTURING CO.
Electrical Specialties of Quality
ESTABLISHED 1904
VALPARAISO · INDIANA

Champion Emery Wheel Dresser

(PATENTED)



ALL-STEEL, LATEST AND BEST

We have evolved an emery wheel dresser that is correct mechanically and will out-wear a dozen of the cheaper types of dressers. The only dresser that runs in an oil bearing.

Let us have your order and do your emery wheel dressing economically and efficiently.

Catalog Upon Request

The WESTERN TOOL & MANUFACTURING CO.
SPRINGFIELD, OHIO
Toolholders, Expanding Mandrels, Shop Furniture, Etc.

New Shop Equipment

Stuebing Cowan "Blue Streak" Lift Truck

One of the newest achievements of the Stuebing Cowan Company, 320 East Court Street, Cincinnati, Ohio, is the "Blue Streak" Lift Truck, which

Stuebing Cowan "Blue Streak" Lift Truck

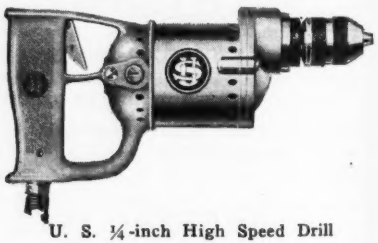
is made in two models and includes twenty-six different sizes. The model "BN" is 17½ inches wide with a standard lift of 1⅝ inches, and is built in lengths of from 41½ inches to 71½ inches, to handle platforms of from 30x36 inches to 30x66 inches. The front wheels are 2 inches wide and the rear wheels are 3 inches wide. Wider faced wheels can be furnished if desired. All wheels run on Hyatt roller bearings and Divine cushion, wood or rubber-tired wheels can be furnished on order.

The Model "BW" is 26⅜ inches wide with a standard lift of 1⅝ inches and is built in lengths of from 53½ inches to 83½ inches, to handle platforms of from 36x48 inches to 36x78 inches. The wheel specifications are the same as for the "BN" Model.

The platform lifts at a single stroke, and the side lift has a radius of full 90 degrees. The more important parts are steel forgings, and the truck is completely standardized, all parts being interchangeable. The Hyatt roller bearings provide for easy starting and fast operation, and the design of the steering apparatus is such that the truck is unusually easy to handle. Every "Blue Streak" is provided with a standard Stuebing hydraulic check, which is placed in the exact center of the truck. This check prevents the possibility of damage to the truck, floor, or operator.

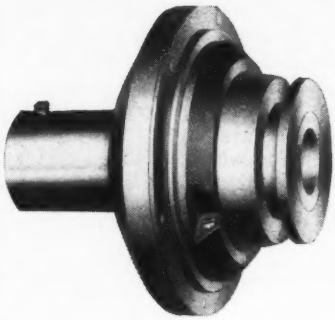
U. S. ¼-Inch High Speed Drill

To meet the growing demand for a higher speed, light weight, ¼-inch



U. S. ¼-inch High Speed Drill

portable electric drill, the United States Electrical Tool Co., 2471 West Sixth Street, Cincinnati, Ohio, now



The Conway Disc Clutch is the last word in friction clutches:

Entirely enclosed
Inherently balanced
With under-slung levers
Large lever ratio
Accessible, accurate adjustment
Easy engagement—quick release
Drag-free idling
Centripetal action
Helped instead of hindered by centrifugal force
Steel discs
Chrome-nickel forged levers
Full length bearing for loose member

It's the first progressive departure in the design of Disc Clutches in many years. Investigate Conway Clutches.

Write For Bulletin DC

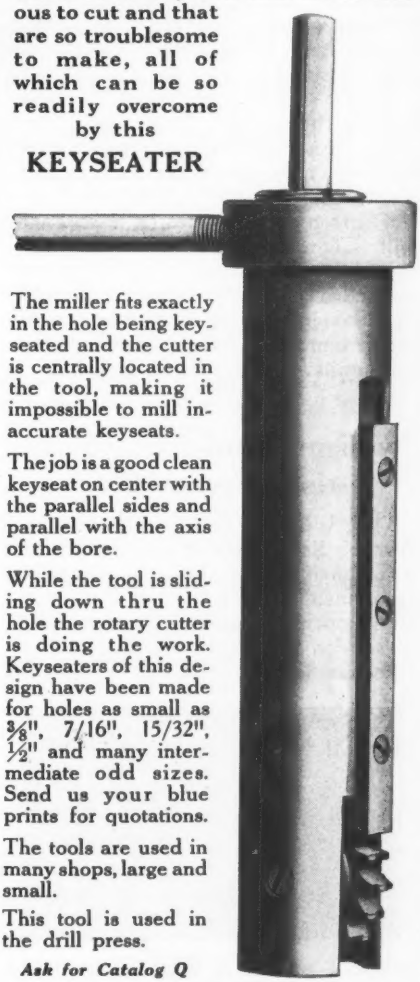
The Conway Clutch Co.
1959 W. 6th St., Cincinnati, Ohio

"There's a kick in the click of an efficient drive."

SMALL KEYSEATS

Those little Keyseats that are so tedious to cut and that are so troublesome to make, all of which can be so readily overcome by this

KEYSEATER



The miller fits exactly in the hole being keyseated and the cutter is centrally located in the tool, making it impossible to mill inaccurate keyseats.

The job is a good clean keyseat on center with the parallel sides and parallel with the axis of the bore.

While the tool is sliding down thru the hole the rotary cutter is doing the work. Keyseaters of this design have been made for holes as small as 3/8", 7/16", 15/32", 1/2" and many intermediate odd sizes. Send us your blue prints for quotations.

The tools are used in many shops, large and small.

This tool is used in the drill press.

Ask for Catalog Q

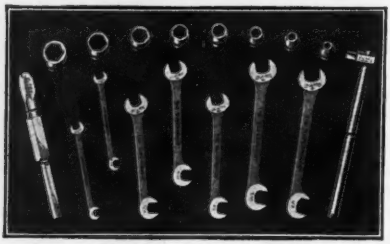
NATIONAL MACHINE TOOL CO.
2271 Spring Grove Avenue
CINCINNATI, OHIO, U. S. A.

has two types of such drills in production. One of these drills, known as the ¼-inch Special Direct-Drive Drill, operates direct on the armature shaft at a speed of 10,000 r. p. m., and weighs only four pounds. The other, known as the ¼-inch Special Gear Reduction Drill, operates at 2,000 r. p. m. and is only one-eighth of a pound heavier.

A new feature on each of these drills is the keyless chuck. Both are easily accessible to close places. Both drills embody the universal motor, operating on either alternating or direct current of 60 cycles or less. Each drill is equipped with SKF ball bearings throughout, double silk insulated enamelled armature wire, chrome nickel steel gears, one-piece frame and commutator head, trigger switch, and similar features of U. S. drills.

Williams-Husky Combination Wrench Set

The Williams-Husky Combination Wrench Set shown in the illustration is claimed to be the only complete assortment on the market that combines open-end and socket wrenches to service the electrical equipment of all makes of automobiles, for general



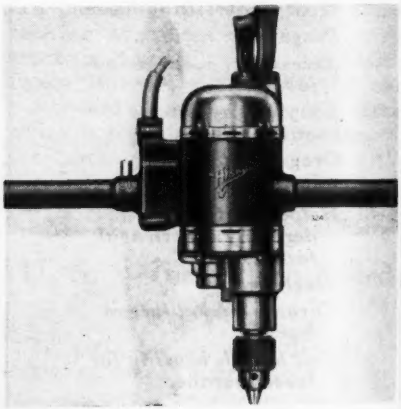
Wrenches included in Williams-Husky Combination Wrench Set

electrical and radio work, and for all small work of this kind. The set contains seven Williams Midget "Super-renches," made of chrome-molybdenum steel, in sizes of 7/32, ¼, 5/16, 11/32, 3/8 and ½ inch, each wrench having two openings of the same size but at different angles—15 and 75 degrees. The Husky wrenches included in the set are eight "Baby" sockets, tapered for work in close quarters, in sizes of 5/32, 3/16, ¼, 5/16, 11/32, 3/8 and 4½ inches Hand Grip. The latter can also be used as an extension.

The set is packed in a convenient and durable metal box, weighing 1½ pounds.

Hisey-Wolf ½-Inch Electric Drill

The Hisey-Wolf Machine Co., Cincinnati, Ohio, is now building a

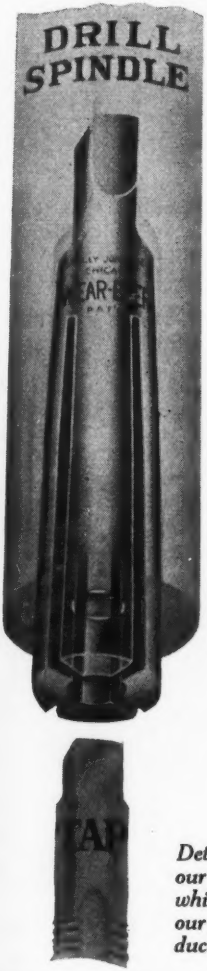


Hisey-Wolf ½-inch Electric Drill

½-inch electric drill which is designed along the general lines of other Hisey-Wolf Electric drills, with the exception of several special features.

The motor is mounted in ball bearings which, in turn, are fitted into the tool in such a way as to entirely eliminate the slip and creeping action. The spindles are of liberal dimensions, hardened and ground where

"DRIVE BY THE SQUARE" "CENTER BY THE SHANK"



Taps, Drills, Reamers, End Mills, Woodruff Keyway Cutters, Etc.

With "SCULLY-JONES" TAP CHUCKS

TOOL ECONOMY—***Straight shank tools*** are given every advantage of solid taper shank tools.

The positive drive reduces tool breakage.

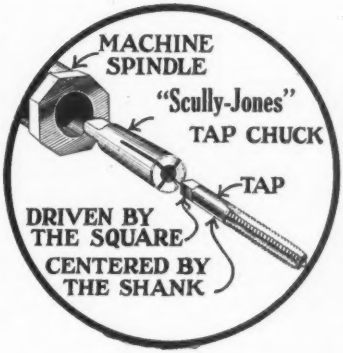
Taps run true and cut uniformly, therefore, ***last longer.***

PRODUCTION ECONOMY—***Quick machine set-ups and tool changes;*** simply insert tools in chucks, then into machine spindle.

The rigid, non-slipping drive and smooth cutting action produce a better finish with ***greater speed.***

Use on ***Multiple Spindle Machines*** for close center, drilling, reaming and tapping.

STOCK SIZES of **"SCULLY-JONES" Chucks,** ranging from No. 0 to No. 5 Morse Tapers, drive all size straight shank tools up to 1½-in. diameter, will be gladly sent on approval.



Detailed information in our Catalog No. 36, which lists and describes our complete line of Production Tools.

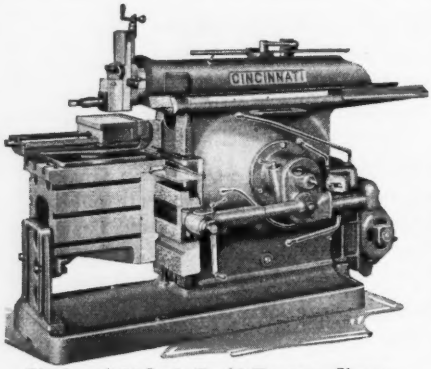
Scully-Jones & Company

1909 S. Rockwell St. ***TOOL DIVISION*** **CHICAGO, ILL.**

necessary, and the brush-holders, which have adjustable spring tension, are mounted as a separate unit on a Bakelite yoke. This feature permits adjustment of the brushes when necessary, and is an important point in the construction of the tool.

Cincinnati 36-Inch Rapid Traverse Shaper

To meet the demand for a shaper in which the speed and convenience of a small machine is combined with



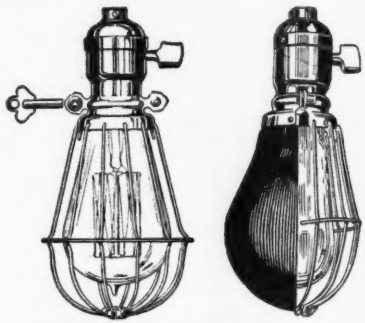
Cincinnati 36-Inch Rapid Traverse Shaper.

the strength and power of a larger one, the Cincinnati Shaper Co., Cincinnati, Ohio, has developed the machine shown in the illustration. The machine is a large, heavy and rigid tool, built for fast speed. The ram is 6 feet 4 inches long, with a bearing in the column of 3 feet 10 inches, and the machine occupies floor space 12 feet 1 inch by 5 feet 2 inches.

The speed of the ram can be varied from 8 to 102 strokes per minute, and the eleven cross feeds range from .010 to .170 inches. These features are not intended to contribute to the fast operation of the machine, however, as much as the special design of the various units. The table is provided with rapid traverse; the speed changes are made simple and fast; the cross feeds can be changed with one movement; one wrench takes care of all adjustment, fitting the tool post, vise, and table support. All control levers are within a 14-inch radius—easily accessible from the operating position. A new "spring throwout" hand feed is provided, and quick control indicators tell at a glance the feed, speed, and length of stroke. A full-length taper gib with simple single-screw adjustment is provided for the ram bearing. The machine can be furnished with single pulley belt drive or arranged for motor drive. A revolving table of large size and with a rocking top is now in production for use with this shaper. Equipped with this table, the shaper will be called the Cincinnati Universal Shaper.

Loxon Lamp Guards

There are many places in the average machine shop where guards should be used on the electric light bulbs, both as a protection against breakage of the lamp and also to prevent unauthorized removal of the lamp from the socket. The Loxon guard, shown in the illustration, is locked to the lamp with a key, thus

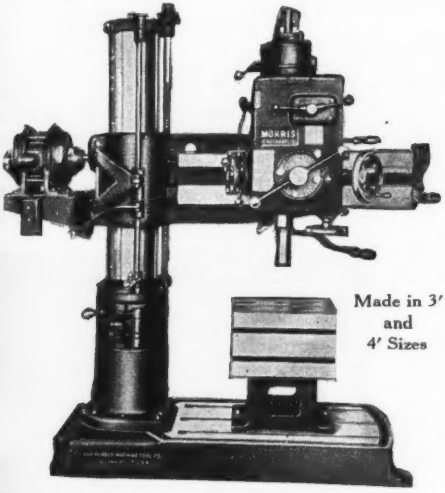


(Left)—Loxon Lamp Guard
(Right)—Loxon Reflector Guard

preventing the removal of either the guard or the lamp.

Loxon guards are made by the McGill Manufacturing Co., Valparaiso, Ind., for all types of sockets. The

"MOR-SPEED"—and we mean it!



Made in 3′ and 4′ Sizes

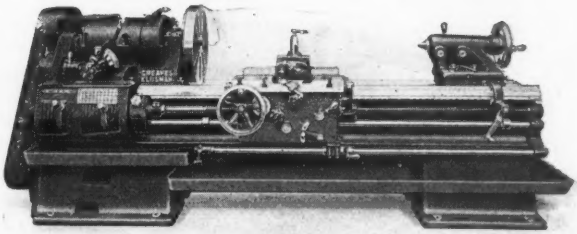
THE new Morris Radial was named "Mor-Speed" with intention. It was designed and built to place more power, more speed at the service of the user and it delivers the goods!

Timken Roller Bearings, hardened broached gears, heat treated multiple splined shafts and spindle, multiple disc clutch and efficient positive lubrication are only a few of the features incorporated in this new machine. Twelve speed changes from 125 to 1600 R. P. M., six feeds from .004 to .025 per revolution, power to drive a 3/16" drill 80 feet per minute, and sufficient power to drive a 1½" drill without difficulty.

THE MORRIS MACHINE TOOL CO.

CINCINNATI, OHIO, U. S. A.

Single Lever Control New G-K Feature



TIME-SAVING features are the aims of modern tool designers. Every effort is put forth to increase production and lessen operating effort.

The new G-K Single Lever Control Heavy Duty Lathes have established production records that will stand for some time.

Any lathe operator can handle them and produce on a schedule equal to that of the man who has been rnnning them for months.

All spindle speeds, of a wide range, are instantly selected through a single lever. This practically eliminates time waste.

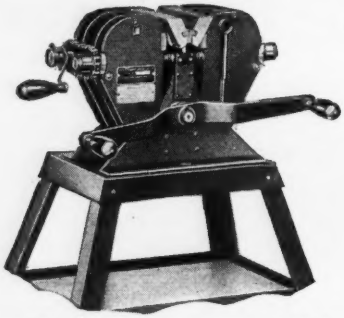
There are a number of other features built into G-K Single Lever Control Heavy Duty Lathes that make them highly capable producers. These are fully detailed in the G-K Catalog.

THE GREAVES-KLUSMAN TOOL CO., Cincinnati, O.

Loxon guard can be quickly and conveniently attached to the socket, and as quickly removed when necessary. The Loxon reflector guard is constructed on the same principle as the standard Loxon guard, with the exception that half of the guard is a solid metal reflector with heavy tinned finish. The reflector directs the light upon the work, focusing the maximum available light upon the point where it is needed, and eliminating the glare which is often the cause of eyestrain and fatigue.

Clipper Speed Lacer No. 6

The Clipper Belt Lacer Co., Grand Rapids, Mich., is now making a belt lacer known as the No. 6, which is of the same type as the No. 8, with the exception that it is lighter and smaller in size. The machine will lace all sizes of belts from 1 inch and including 6 inches in one and a half minutes, which makes it particularly adaptable for plants using a large number of small belts. A three-quarter turn of the crank forces a row of



Clipper No. 6 Belt Lacer equipped with Stand.

Clipper Hooks uniformly into a 6-inch belt with a pressure of 37,500 pounds, embedding the hooks in perfect alignment and flush with the surface, which prolongs the life of the lacing and reduces wear on the hooks and pulleys to a minimum. The weight of the machine is 56½ pounds alone, although it can be supplied with a stand if desired.

"National" Draftsman's Pen-Filling Inkstand

In order to simplify the draftsman's task by doing away with the glass bottle and quill cork, the National Tool Engineering Company, Box 712, Indianapolis, Ind., is now marketing the pen-filling inkstand shown in the illustration. The "National" stand not

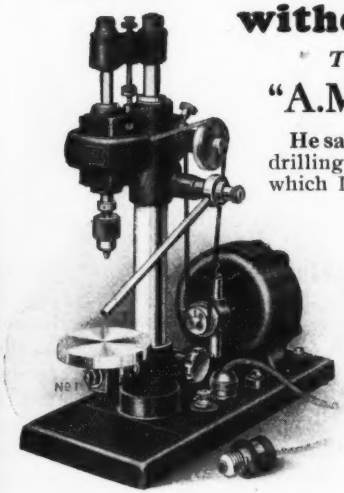
"National" Draftsman's Pen-Filling Inkstand.

only provides a heavy, large-base container, but it also has a steel filler-pen with which the draftsman can quickly and easily fill his ruling pen. As shown in the illustration, the draftsman does not have to lay the pen down or change the position of it in his hand in order to fill it; pressure on the ring with his little finger raises the cap, carrying the filler-pen, filled with ink. The stand weighs three pounds, and can be placed near or on the work without fear of splashing or upsetting.

Danly Spring Chart

Danly Machine Specialties, Inc., 2104 South Fifty-second Avenue, Chicago, Ill., has issued a wall chart for use by designers, toolroom superintendents, and die makers, listing the pressure pad springs, stripper plate

15,000 No. 68 holes drilled without breaking a drill!



That is what one man did with an

"A.M." Sensitive Drilling Machine

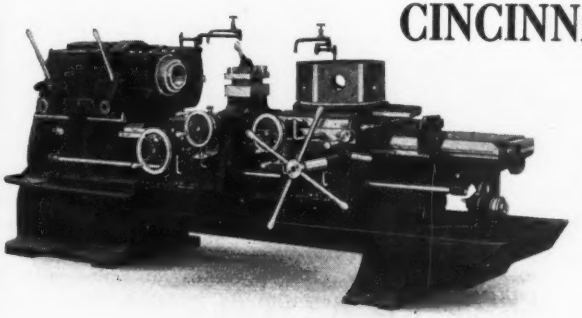
He says: "You will remember the trouble I had with drilling No. 68 holes in parts for X-Rays, during which I broke several gross of drills. You may be interested to know that after setting up your No. 1 machine, I drilled 15,000 holes without taking the drill out of the chuck. No machine I have ever seen can compare with it."

No toolroom is complete without an "A.M." Sensitive Drilling Machine. Soon pays for itself on fine drilling work. Ask us for "An Outline of Economical Small Drilling."

ADOLPH MUEHLMATT
Fifth and Elm Sts., S. E., Cincinnati, O.

2 Levers { Control Start, Stop, Reverse and Speed Changes To Spindle on the

CINCINNATI ACME



No. 3

AND

17" and 4½' Heavy Type Universal Turret Lathes

THE ACME MACHINE TOOL COMPANY
CINCINNATI, OHIO

springs, and knockout springs made by this company. The complete line of Danly springs, both flat, round and square, is shown, together with full dimensions, loadings, inside and outside diameter (which are easy working fits in standard stripper bolt and drill holes), the line covering the entire range encountered in die work.

The chart should be particularly valuable because of the systematic manner in which the information is tabulated, the tables being arranged for quick reference. The chart will be sent without cost upon request.

Pease Blue-Printing Equipment Catalog

The complete Pease line of blue printing machinery and equipment, blue print papers, and drafting room furniture is illustrated and described in the new Catalog M-69, issued by The C. F. Pease Company, 869 North Franklin Street, Chicago, Ill. All the various types of machines for both large and small shops are included, with detailed descriptions of the various types of lamps, motors, and other parts that are included as a part of the machine equipment, also information as to the individual characteristics and advantages of each type or size of machine. The catalog also includes descriptions of photographic arc lamps, proofing machines, tables and shears for cutting, tracing tables, blue, white and brown print papers, paste, and small tools such as shear, stapling machines, and so on. The catalog will be sent free upon request.

Uses of Time Study

(*Continued from page* 26)

the time to make sure that it is right and to prove to the operator that he is, in reality, doing the job in the time set. No time study man should ever try to make a time study from a distant point; the best method of going about the job is to tell the operator frankly that the job is to be timed, and enlist his co-operation. If the time study man achieves a reputation for honesty, frankness and fairness, he will have little trouble.

The last admonition is—never cut a rate after it has once been set. Make sure that it is right before putting the official stamp upon it, then let the men "go to it." Never cut the rate unless the change is warranted by a change in the method of doing the job. As long as the men know the rates will stand, they will make as much as they can, which means increased production without increased overhead or extra equipment. It takes only one cut to destroy the confidence that has been built up, and from that time on the production will be limited to an amount that can be safely turned out without danger of a cut.

Unusual Drilling Jobs

(*Continued from page* 36)

which meshes, at this point, with a quadrant arm which is mounted in a fixed position at the center of the table. A close-up view of the jig-turning mechanism with the housing removed is shown in Fig. 9. The operation of the various units of the entire machine is so co-ordinated that, as the foot pedal is released, the table indexes, the jig reverses for chamfering, the locating pin drops into place, and the spindles automatically approach and go to work. Six shackle forgings are produced complete per minute on this operation. The installation of this unit released for other work three operators, four machines, and most of the space that they occupied.

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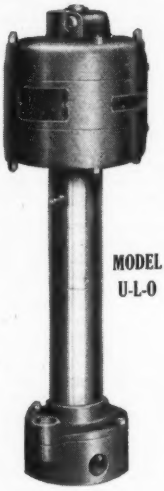

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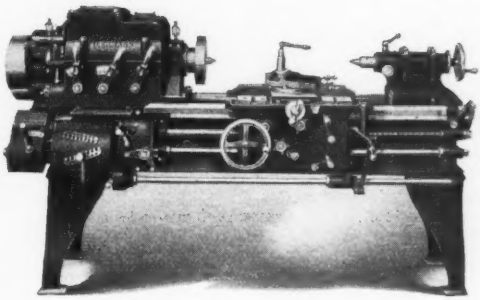

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Turret Lathes and Tools: Illustrated book describing Cincinnati Acme Turret Lathes and Screw Machines, and showing a variety of tools and fixtures for use with these machines. The Acme Machine Tool Co., 4955 Spring Grove Ave., Cincinnati, Ohio.

Scraping By Power: Bearing surfaces can now be scraped with a power scraper that is quicker and easier than the old-fashioned hand method. The tool is described in a folder that is issued by Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill. Sent free on request.

Machine Shop Accessories: Catalog B-27, issued by the Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., describes the line of tool holders, boring tools, wrenches, pipe tools, ratchet drills, lathe dogs, and other tools manufactured by this company.

Metal and Wood Saws: Catalog No. 20 describing saws of all kinds, for both metal and wood. 256 pages of descriptions of saws and sawing machinery. E. C. Atkins & Co., 402 S. Illinois St., Indianapolis, Ind.

All-Geared Drilling and Tapping Machines: A catalog describing in detail the various types of all-geared, self-oiling, drilling and tapping machines made by the Barnes Drill Co., 801-851 Chestnut Street, Rockford, Ill., will be sent free upon request.

Modern Drilling Equipment: Circulars describing the various types and sizes of Barnes upright drills, multiple drills, and horizontal drilling machines, has been issued by the W. F. & John Barnes Co., Rockford, Ill.

Bowsher Balancing Way: Gears, pulleys, fly-wheels, emery wheels, and other rotating parts should be properly balanced. This work can be done quickly and accurately on a balancing way that is described in a bulletin issued by The N. P. Bowsher Co., South Bend, Indiana.

"The Lathe With the Longer Life" is the title of a bulletin that describes the Coneless Lathes made by the Boye & Emmes Machine Tool Co., 2247 Spring Grove Ave., Cincinnati, Ohio.

Bradford Unit Type Drill Heads and Tapping Heads are described and illustrated in a bulletin published by the Bradford Machine Tool Co., 659 Evans Street, Cincinnati, Ohio. The bulletin also describes useful applications of these heads.

Bradford Precision Lathes: Precision Lathes for the tool room and for general manufacturing purposes, all-geared and cone types, belt or motor driven, are described and illustrated in a catalog that is issued by The Bradford Machine Tool Co., 657-671 Evans St., Cincinnati, Ohio. The catalog also includes descriptions of taper, relieving, turret and other lathe attachments. Sent free upon request.

Brent Buys Radial Drills: A story of the methods used by a plant executive to determine what type of machine is best suited to his purpose. Published by The Cincinnati Bickford Tool Co., Oakwood, Cincinnati, Ohio.

Gear Data: The Cincinnati Gear Co., Cincinnati, Ohio, has published Catalog D, which describes and illustrates the various type and kinds of gears made by this firm. The book contains photographs of the plant departments, with descriptions of the equipment employed, and also includes a number of pages of valuable data and reference tables for machine shop use.

Rapid Traverse Planers: Cincinnati Hypro Planers, made by the Cincinnati Planer Co., Cincinnati, Ohio, are described in a new catalog that has been issued by this company.

Shaper Progress: An illustrated catalog describing the various types of shapers made by the Cincinnati Shaper Co., Cincinnati, Ohio, and including descriptions of Cincinnati Shapers in use in different kinds of plants.

"The Lathe With the Pull" is the title of a catalog that has been published by the Cisco Machine Tool Co., 1765 Elmore St., Cincinnati, Ohio. The book describes the engine lathes, polishing lathes, and radial drill presses made by this firm.

Handbook For Drillers: The Cleveland Twist Drill Co., 1242 E. Forty-ninth St., Cleveland, Ohio, has published a book in which the various parts of the twist drill are described, and which tells how to grind a drill correctly. The troubles that result from incorrect grinding are described and illustrated and several chapters are devoted to the subjects of speeds, feeds, materials, cutting compounds, and so on.

Disc, Expansion and Compression Clutches: The various types of clutches and their uses are discussed in an illustrated booklet that is issued by The Conway Clutch Co., 1959 West Sixth Street, Cincinnati, Ohio.

Die Makers' Supplies: A complete line of die sets, leader pins, bushings, and other die makers' supplies are described in a book that is issued by the Danly Machine Specialties, Inc., 2104 South 52nd Avenue, Chicago, Ill. Sent free upon request.

Formica Silent Composition Gears: A booklet telling about the uses and advantages of Formica Silent Shock-Absorbing Gears, and containing a considerable amount of valuable data with rules and tables for laying out, cutting and using gears. Sent free by Formica Insulation Co., 4632 Spring Grove Avenue, Cincinnati, Ohio.

Fosdick Drills: This publication gives details as to the design and construction of Fosdick Radial, Upright, and Sensitive Drills. Published by the Fosdick Machine Tool Co., Cincinnati, Ohio.

Quick-Acting Clamp: A bulletin describing the "Rapid" drop-forged steel clamp manufactured by the Fountain Equipment & Mfg. Co., 2025 Elm St., Cincinnati, Ohio, has been issued by this firm.

Machinists' Tool Cases and Chests: The high grade tool cases and tool chests manufactured by H. Gerstner & Sons, 1254 Columbia St., Dayton, Ohio, are described in detail in catalog No. 27, which can be had by writing to this company.

Greaves-Klusman Lathes: A book containing complete descriptions of the latest types of lathes made by this firm has been issued by the Greaves-Klusman Tool Co., Oakley, Cincinnati, Ohio.

Drilling and Grinding Electrically: Catalog M, showing and describing a variety of modern electric portable drills, grinders, and other tools, including floor grinders and buffers, has been issued by The Hisey-Wolf Machine Co., Colerain and Marshall Sts., Cincinnati, Ohio.

Modern Milling Equipment: A book describing and illustrating in detail all the parts of various types of milling machines and showing a number of ways of handling milling jobs will be sent free to the readers of this magazine by the Kearney & Trecker Corporation, Milwaukee, Wis.

Automatic Lathe Operation: The new Catalog No. 16, which has been published by the R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, describes the construction and operation of the LeBlond No. 16 Heavy Duty Automatic Lathe. A number of tooling layouts for use with this lathe are also shown.

Cutter and Tool Grinding: A book that tells how to grind tools and cutters accurately and which also describes and illustrates the different types of LeBlond Universal Tool Room Grinders will be sent free upon request. Address, The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio.

Lehmann Lathes: Details of the outstanding features of Lehmann Lathes are given in a catalog published by the Lehmann Machine Co., 3560 Chouteau Av., St. Louis.

Air-Operated Work-Holding Devices: A booklet showing how air-operated chucks and devices of various kinds can be applied to different kinds of machines is

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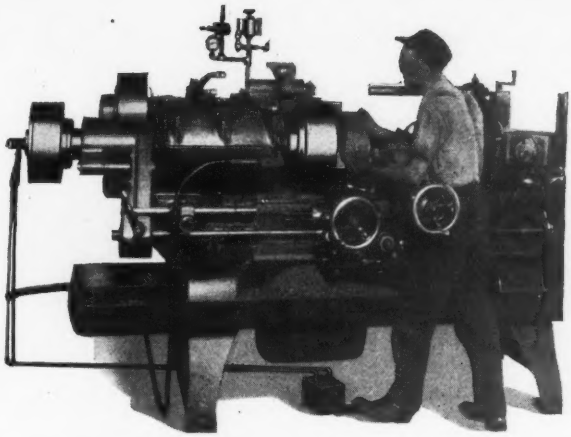

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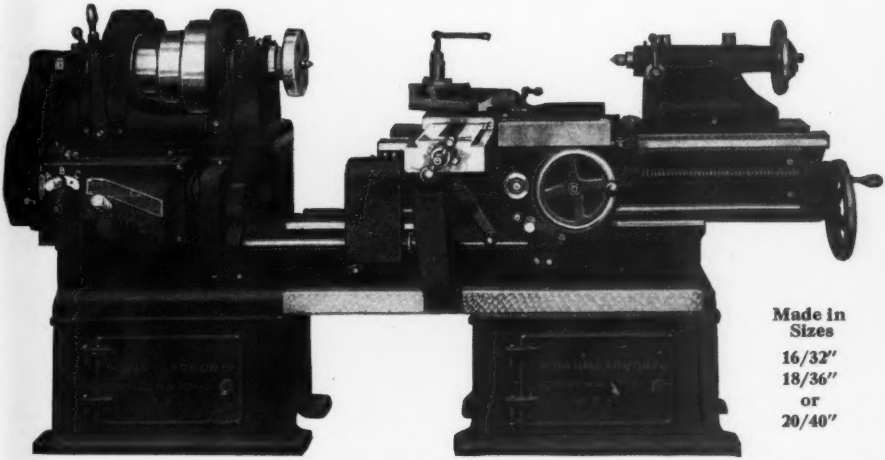

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save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

Lamp Guards: The various types and kinds of lamp guards made by the McGill Manufacturing Co., Valparaiso, Ind., for factory use are described in a catalog that will be sent free upon request.

Modern Lathe Design: A bulletin describing and illustrating the features of the Monarch 16-speed Helical Geared Timkenized Lathe has been published by The Monarch Machine Tool Co., Sidney, Ohio.

Roller Bearing Radial Drills: The application of Timken roller bearings in the design of modern radial drilling machines is discussed in a bulletin describing "Mor"-Speed Radial Drills, published by the Morris Machine Tool Co., Cincinnati, Ohio.

An Outline of Economical Small Drilling: The subject of small-hole drilling is discussed in a booklet that is published by Adolph Muehlmatt, Fifth and Elm Sts., S. E., Cincinnati, Ohio. The booklet also describes the outstanding features in the construction of the A. M. Sensitive Drilling Machine.

"The 'Hole' Story in One Word" is the title of a publication that has been issued by The National Automatic Tool Co., Richmond, Ind. The book gives details as to construction and uses of "Natco" multiple drilling and tapping machines.

Milling Internal Keyways: A simple method of milling keyways in gears, wheel hubs, and other similar parts with the aid of a drill press and a special tool is explained in a booklet that is published by the National Machine Tool Co., 2271 Spring Grove Ave., Cincinnati, Ohio.

Grinding Wheel Information: A booklet which tells how grinding wheels are made and graded, and which gives instructions for mounting wheels, operating speeds for different kinds of work, instructions for truing and dressing, and other information has been issued by the Norton Company, Worcester, Mass. Sent free upon request.

"Tool Room Grinding" tells how to sharpen milling cutters and how to grind drills, taps, reamers, lathe and planer tools, and dies. A number of drawings and photographs are shown, showing how to hold the tools for grinding, and the kinds of chips that should be produced by properly-ground tools, etc. Published by Norton Co., Worcester, Mass.

"Offset" Milling: A booklet that explains the offset principle of continuous milling and describes the applications of this method will be sent free to executives who address The Oesterlein Machine Co., 3319 Colerain Ave., Cincinnati, Ohio.

Correct Cutter Grinding: How cutter costs can be reduced and more production per grind of cutter obtained is told in Booklet "E," published by The Oesterlein Machine Co., 3319 Colerain Ave., Cincinnati, Ohio. Sent free upon request.

Engine, Turret, and Gap Lathes are described in a series of bulletins that have been issued by The Rahn-Larmon Co., 2935 Spring Grove Ave., Cincinnati, Ohio.

Automatic Lubrication: Individually motor-driven pumps that keep the work flooded with lubricant are described in a booklet that has been published by the Ruthman Machinery Co., Front and Pike Sts., Cincinnati, Ohio.

Engineering and Manufacturing Service: A complete engineering and manufacturing service for manufacturers who are not equipped to handle all of their own designing, experimental, or production work is described, with illustrations of the equipment available, in a bulletin that is issued by The Steel Products Engineering Co., Springfield, Ohio.

Saving Time With Small Tools: A line of time-saving small tools, including "Use-Em-Up" drill sleeves, "Wear-Ever" chucks, collets, cutters, reamer and tap holders, counterbores, spotfacers, and other tools is described in Catalog 36, issued by Scully-Jones & Co., 1909 S. Rockwell St., Chicago, Ill.

Material-Handling by Modern Methods: Modern methods of storing and transporting materials in the shop are discussed in a bulletin which also describes the various types of lift trucks manufactured by The Stuebing Cowan Company, 320 East Court St., Cincinnati, Ohio. Sent free upon request.

Twentieth Century Balancing Tool: A practical, sensitive and inexpensive device for balancing pulleys, flywheels, and other round parts is described and illustrated in a bulletin that will be sent without charge by the Sundstrand Machine Tool Co., Rockford, Ill.

Chuck With Air: How time and labor can be saved by the use of air-operated chuck, cylinders, and other equipment is told in a book which describes "Hopkins" Air-Operated Equipment. Published by The Tomkins-Johnson Company, 620 N. Mechanic St., Jackson, Mich. Sent free upon request.

Multiple Drilling With a Single-Spindle Drill: Methods by which multiple drilling may be done on a single-spindle drill, using multiple spindle drill heads, are discussed in a bulletin that is issued by The United States Drill Head Co., 1954 Riverside Drive, Cincinnati.

Electrically-Driven Portable Tools: The "U. S." line of electric drills, die grinders, electric screw drivers, surface grinders, tool post grinders, and bench and floor grinders is described in Catalog No. 24, which has been published by The United States Electrical Tool Co., 2471 W. Sixth St., Cincinnati, Ohio.

Shop Furniture: A catalog describing and illustrating all kinds of shop furniture, including benches, vises steel stands, foremen's desks, chip trucks, steel racks for bar stock, steel tote boxes, and other equipment will be sent free upon application to The Western Tool & Manufacturing Co., 1620 East Pleasant Street, Springfield, Ohio.

Putting Air to Work

(*Continued from page* 18)

one movement of a lever, then the ends are placed in position at the ends of the rods. The tie-rod end is revolved by a solid open-end piece similar to a large wrench jaw, attached to the spindle of an air motor, which in turn is attached to the piston rod of an air cylinder. To assemble the piece, the mechanic places the tie-rod in position between the jaws of the two vises, where it is clamped with one movement of a lever, and starts an end on the thread. He then turns a lever which lets the air into the air cylinder, thus forcing the air motor ahead so that the jaw engages the tie-rod end. At this point the motor is started, and as the jaw revolves, it revolves the end and threads it onto the rod. The operation is repeated at the opposite end of the rod, the whole operation requiring much less time than is required to describe it. One end of the machine is illustrated in Fig. 9, showing a jaw, air motor, and cylinder.

These are but a few of the devices that have been developed to harness air and make it perform all kinds of useful, productive labor.

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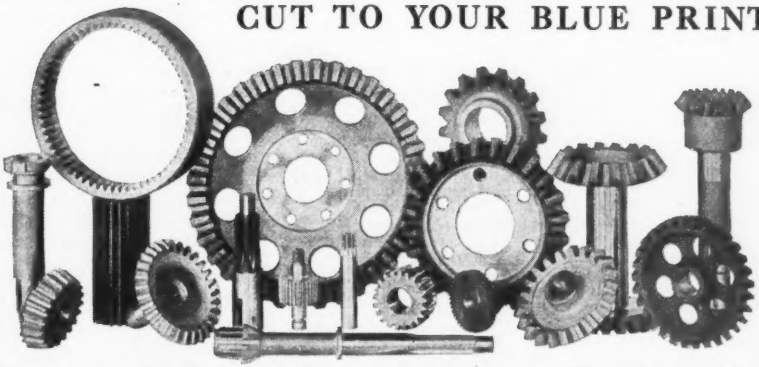

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- ☐ Abrasive Polishing Grains
- ☐ Arbors
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- ☐ Balancing Machines
- ☐ Balancing Ways
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- ☐ Bearings, Die-cast
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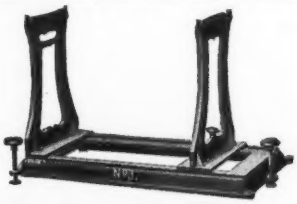

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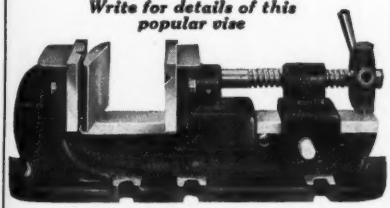

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Keep the Floor Clean!

It is not impossible for a slovenly workman to be a good mechanic, but it will generally be found that the man who is neat as to his personal appearance also takes pride in the quality of his work. By the same token, the foreman whose department floor is clean is usually found among the producers. "Keep everything off the floor" is the first rule of system and order in the shop. All materials except machine units or very large pieces should be placed in stock boxes or bins, or piled on platforms. The lift truck, with the platforms which are a part of the truck equipment, has done more to bring order out of chaos in the machine shop than any other one agency. Waste cans should be provided in all departments for newspapers, paper lunch boxes, and other refuse. Broken or worn tools should either be put into service or returned to the tool crib for proper disposal. Adequate receptacles should be provided for shavings. In other words, if nothing is to be allowed on the floor, a place must be found or made for everything. And no matter what the initial expense for platforms, containers or bins is, the shop owner or superintendent will find that it is worth it.

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A GERSTNER TOOL CHEST

for System and Protection. A definite place for every tool is provided. Protect yourself from lost, damaged or "borrowed" tools. 30 sizes in a dozen styles are shown in free catalog.
A postal brings it.

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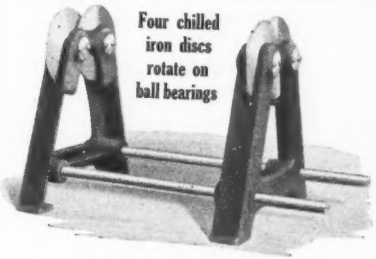
Balancing Ways
No Leveling Required

A simple and excellent device for balancing, straightening and trueing.

They are made in the following sizes:

Swing	Greatest Distance Between Standards	Capacity in Lbs.
20 in.	20 in.	1,000
40 in.	30 in.	2,000
60 in.	30 in.	2,000
72 in.	66 in.	5,000
96 in.	88 in.	10,000



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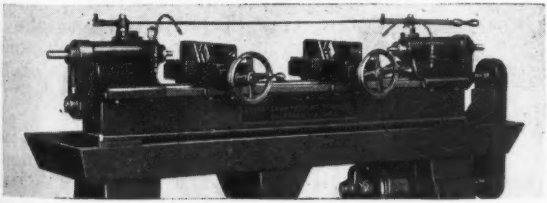

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Double End Centering Machine

For centering both ends of a shaft simultaneously. Spindles operate together or independently. L. H. head is removable for long shafts. Accommodates a wide variety of work. Special fixtures furnished when desired. Send for Bulletin.

SUNDSTRAND MACHINE TOOL CO. **Rockford, Illinois**

Riff-Raff Ravings

By GEO. ALEXANDER MANN
Raver-in-Chief

Ask the Boss—He Knows

For those who of their loyalty
Would give a demonstration—
"An hour of overtime is worth
Four hours of conversation"—

The Ground Hog hasn't a monopoly on seeing shadows. The Timid Man keeps himself in eclipse because he is always seeing Trouble just ahead of him!

Guess Which Half

Judgin' from the pictures in the newspapers, mos' o' the so-called bathin' beauties would look better half under water.

Remember that you don't have to go to hell on the first invitation.

Troo Enuff

When there's nothing more to be done some man does it—when there's nothing more to be said some woman says it.

Some Come-Back

She said, "I like variety"—
He was there with his lines.
He said, "Look me over, kid,
An' mit me—my name's Heinz."

Pluck without purpose is like sailing an uncharted sea without a compass.

If a guy has more wishbone than backbone, fortune will never make him an odds-on favorite in life's sweepstakes.

It's A Way With 'Em

A Scotchman saw the sign "free air"
Now crape his door-knob wears,
He blew the tires off all four wheels,
An' busted up two spares.

The man who has no confidence in himself will never rise very high in the scale of values and is in training to stick in the "back stretch" all his life.

Aint Ut Tha Troof?

Bricks are life's contributions—your success depends upon the results—whether they put you to sleep or keep you awake.

Oh Mabel—Hush

"Don't marry a man who snores"
As advice is good, no doubt,
"But," asks Mabel, "my goodness,
"How are we goin' to find out?"

Work without play is drudgery; play without work is foolishness.

Why Maw—Shame

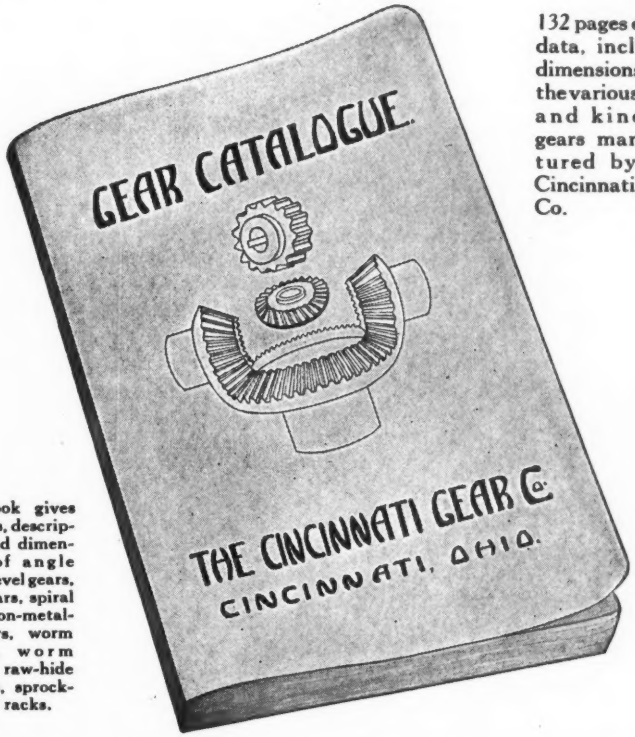
Maw says "how folks can take a chance in an air chu chu is beyond me—I went to a roller skatin' rink once and one tail spin is enough."

The old-fashioned girl who useta worry for fear three petticoats weren't enough now has a friend daughter who is kept busy pushing her belt up under her arms to keep it from hiding her skirt.

This Catalog Free—

to any machine shop executive!

132 pages of gear data, including dimensions of all the various types and kinds of gears manufactured by The Cincinnati Gear Co.



The book gives the sizes, descriptions and dimensions of angle gears, bevel gears, spur gears, spiral gears, non-metallic gears, worm gears, worm wheels, raw-hide pinions, sprockets, and racks.

All Kinds of Information For Users of Gears

is also included, such as tables showing horsepower of various kinds of gears, proportions of various types of gears, rules for ordering gears, metric conversion table, comparative sizes of gear teeth, table for calculating speeds of pulleys, etc.

Ask For It, Giving Name of Firm and Title

THE CINCINNATI GEAR CO.

CINCINNATI, OHIO

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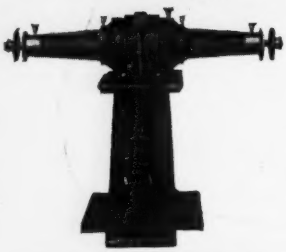
SINCE 1897



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